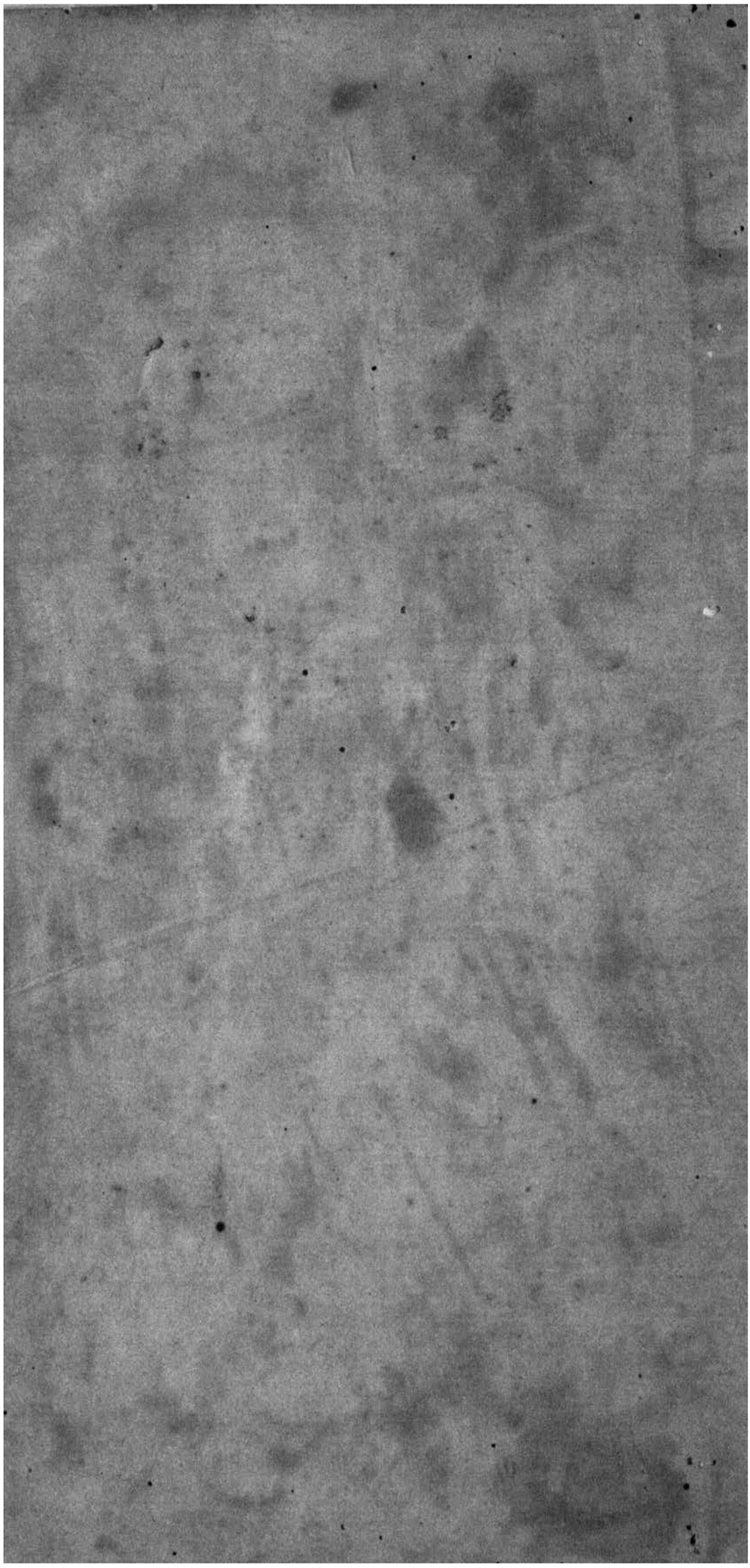
GOVERNMENT OF INDIA.
NATIONAL LIBRARY, CALCUTTA.

Class No. P.P. 614.

Book No.

N. L. 38.

MGIPC—S4—6 LNL—25-7-52—15,000.



No. 24 of 1871.

SUPPLEMENT TO

The Gazette of India.

SIMLA, SATURDAY, JULY 1, 1871.

OFFICIAL PAPERS.

A SUPPLEMENT *to the* GAZETTE OF INDIA *will be published from time to time containing such Official Papers and information as the Government of India may deem to be of interest to the Public, and such as may usefully be made known.*

Non-Subscribers to the GAZETTE *may receive the* SUPPLEMENT *separately on a payment of six Rupees per annum if delivered in Calcutta, or ten Rupees eight annas if sent by Post.*

No Official Orders or Notifications, the publication of which in the GAZETTE OF INDIA *is required by Law, or which it has been customary to publish in the* CALCUTTA GAZETTE, *will be included in the* SUPPLEMENT. *For such Orders and Notifications the body of the* GAZETTE *must be looked to.*

GOVERNMENT OF INDIA,

HOME DEPARTMENT.

PROVISION OF FUNDS FOR SCHOOLS ESTABLISHED UNDER LORD CANNING'S MINUTE OF 1861.

From E. C. BAYLEY, ESQ., C. S. I., Secretary to the Government of India, Home Dept., to the Chief Secretary to the Government of Bombay in the Educational Department,—
No. 243, dated Simla, the 20th June 1871.

THE Governor General in Council has observed the entries Nos. 15 and 18 in the Proceedings of the Government of Bombay in the Educational Department for the month of April last, relative to the provision of funds to meet applications made in behalf of schools under Lord Canning's Minute of 1861.

2. As regards the first entry, I am to point out that the Government of India has not transferred the burden of assisting educational institutions, like the Diocesan School at Byculla, to the Local Governments, without the provision of funds to meet such demands. The sum transferred to the Local Governments was intended to include, and was sufficient to meet, provision for all reasonable demands made in behalf of these educational institutions equally with all other kinds of educational institutions.

3. Again, the Resolution recorded in the second entry (No. 18) would virtually reverse the imperial policy initiated by Lord Canning's Minute, and abrogate the rules in force under it. It was, I am to observe, far from the intention of the Government of India in the new financial arrangements to relieve Local Governments from the enforcement of principles of imperial

policy which the Supreme Government may have laid down, or may hereafter lay down, for general observance.

4. The Governor General in Council is willing to admit that in some Provinces schools established under Lord Canning's Minute have heretofore been maintained on an expensive footing, and without due regard to the precise scope of the intentions of the minute. If this has occurred also in Bombay, it is quite open to the Local Government to correct this practice, and in future to restrict the grants on account of these schools to more suitable dimensions, and to institutions which really educate the classes for whose benefit the rules based on the minute were framed.

Extract from the Proceedings of the Government of Bombay in the Educational Department, for the month of April 1871.

[No. 15.] No. 276, April 21st.

THE Under Secretary to the Government in the Public Works Department, No. 502, dated the 21st March 1871, transfers a letter from the Honorary Secretary, Bombay Diocesan Board of Education, regarding an application made by the Board to Government for a moiety of the cost of purchasing a house in Love Lane for the accommodation of the Diocesan School at Byculla, and expresses a hope that, as funds for the purpose cannot be provided in the Public Works Department, no action will be taken in the Educational Department which will throw a liability on that (Public Works) Department.

RESOLUTION.—The Secretary to the Diocesan Board should be informed that, under the new financial arrangements ordered by the Government of India, the burden of assisting educational projects of this kind has been transferred to the Local Government without the provision of funds to meet such demands. His Excellency in Council has, therefore, no alterative but to refuse the application.

[No. 18.] No. 288, April 24th.

THE Director of Public Instruction, No. 4422, dated the 31st March 1871, submits, with his recommendation, an application from the Honorary Secretaries of the Bombay Scottish Education Society for a site, and a grant to purchase a site, for their school at Byculla.

RESOLUTION.—The applicants should be informed that their request cannot be complied with. It has already been publicly announced that, in consequence of the change in the financial arrangements of this Presidency, which has been ordered by the Government of India, the expectations which Lord Canning's minute was calculated to give rise to can no longer be realised, inasmuch as no provision has been made for making grants in conformity with that minute from imperial funds, and the resources placed at the disposal of the Local Government will not admit of their undertaking the responsibility of continuing such grants. A portion of the concessions demanded go beyond the terms of Lord Canning's minute, and would be inadmissible on other grounds, but under present circumstances it is not necessary to discuss this point.

2. The Director of Public Instruction should communicate this decision to the applicants, and should make similiar replies to *any future applications* which may be made under Lord Canning's minute.

3. At the same time copy of the papers should be transferred to the General Department in order that the attention of the Collector of Bombay may be directed to the plots of ground referred to, and that he may report what is the precise position of Government with respect to the said plots, and what he proposes to do on the expiration of the lease of one of them.

GOVERNMENT OF INDIA.

PUBLIC WORKS DEPARTMENT.

IRRIGATION OPERATIONS OF FUSL KHURREEF IN THE PUNJAB UP TO 30th APRIL 1871.

Canal Division.	Water distributed during April 1871. Depth in Canal at regulating guage. Full supply.	Depth in Canal at regulating guage. Actual throughout April.	Gross consumption, cubic feet per second. Estimated full supply.	Gross consumption, cubic feet per second. Actual average throughout April.	Navigation Return Canal. Principal items of Traffic. Up.	Navigation Return Canal. Principal items of Traffic. Down.	Land irrigated (approximate). Zillah.	Land irrigated (approximate). Acres.	Rain-fall. Average.	Rain-fall. During month.	Chief crops (approximate). Name.	Chief crops (approximate). Area in acres.	Remarks.
									Inches.	Miles.			
B. D. Canal. 1st Division ...	4·9	3·53	.....	733·06	...	.....	Goordaspoor ...	2,217	0·89	*Nil.*			389·02 cubic feet per second passed down the various escapes.
B. D. Canal. 2nd „ M. B. Lower ...	4·6	3·37	.....	870·78	...	.....	Umritsur ...	521	0·25	0·37			
B. D. Canal. „ „ Lahore Branch ...	3·3	2·60	3,073·6	434·04	...	.....	Lahore ...	4,307	...	...	Cotton ...	2,834	
											Rice ...	125	
											Sugarcane...	2,552	The supply maintained was fully equal to the demand.
											Others ...	1,534	
Total Baree Doab Canal ...	.....	.....	3,073·6	2,037·88	*Nil.*	*Nil.* ...	.....	7,045	...	...	.....	7,045	On the Western Jumna Canal the increase is principally in cotton.
Corresponding period of last year	.....	.....	.....	1,091·31	...	.....	.....	6,370	...	...	.....	6,370	
Western Jumna Canals. Kurnaul Division ...	4·33	3·66	.....	312·89	...	80,885 logs, kurrees, bullies, &c.	Umballa ...	*Nil.*	0·55	0·17			As this is the return for the first month of the khurreef it would manifestly be premature to draw any conclusions from the slight increase in area irrigated, as compared with the corresponding period of last year.
Western Jumna Canals. Delhi „ ...	4·4	.....	.....	708·83	...		Kurnaul ...	3,646	0·40	0·46			
Western Jumna Canals. Hansi „ ...	8·8	.....	.....	407·90	...		Delhi ...	10,142	...	*Nil.*			
Western Jumna Canals. „ Bulla Head ...	8·4	.....	2,546·0	237·10	...		Rohtuck ...	10,664	...	0·60	Cotton ...	11,471	
							Hissar ...	4,729	...	*Nil.*	Rice ...	13	
							Jheend ...	1,734	not	kept	Sugarcane...	17,353	
							Bikaneer ...	95	„	„	Others ...	2,173	
Total Western Jumna Canals ...	.....	.....	2,546·0	2,066·72	...	80,885	.....	31,010	...	...	.....	31,010	
Corresponding period of last year	.....	.....	.....	1,817·4	...	51,841	.....	22,628	...	...	.....	22,628	
Inundation Canals. Upper Sutlej Division ...	.....	.....	.....	.....	...	.....	Lahore ...	*	...	...	.....	.....	* The canals in the Upper Sutlej Inundation Canals Division were dry during April.
Inundation Canals. Lower Sutlej and Chenab	.....	.....	.....	.....	...	.....	Montgomery ...	*	0·0	0·82	.....	.....	
Inundation Canals. Indus Canals	.....	.....	.....	.....	...	.....	Mooltan ...	†	...	...	.....	.....	† The returns for April have not been received from the Executive Engineers of the Lower Sutlej and Chenab, or Indus Canals Divisions. It is believed that the canals in those Divisions were also dry, their supply being dependent on the rise in the rivers.
							Dera Gazee Khan	†	...	...	.....	.....	
Total Inundation Canals ...	.....	.....	.....	.....	...	.....	.....	.....	...	...	.....	.....	
Delhi and Goorgaon Works.	.....	.....	.....	.....	...	.....	.....	.....	...	...	.....	.....	
Total Delhi and Goorgaon Works	.....	.....	.....	.....	...	.....	.....	.....	...	...	.....	.....	
Grand Total ...	.....	.....	.....	.....	...	80,885	.....	38,055	...	...	.....	38,055	
Corresponding period last year ...	.....	.....	.....	.....	...	51,841	.....	28,998	...	...	.....	28,998	

No. 25 of 1871.

SUPPLEMENT TO

The Gazette of India.

SIMLA, SATURDAY, JULY 8, 1871.

OFFICIAL PAPERS.

A SUPPLEMENT *to the* GAZETTE OF INDIA *will be published from time to time containing such Official Papers and information as the Government of India may deem to be of interest to the Public, and such as may usefully be made known.*

Non-Subscribers to the GAZETTE *may receive the* SUPPLEMENT *separately on a payment of six Rupees per annum if delivered in Calcutta, or ten Rupees eight annas if sent by Post.*

No Official Orders or Notifications, the publication of which in the GAZETTE OF INDIA *is required by Law, of which it has been customary to publish in the* CALCUTTA GAZETTE, *will be included in the* SUPPLEMENT. *For such Orders and Notifications the body of the* GAZETTE *must be looked to.*

GOVERNMENT OF INDIA.

DEPARTMENT OF AGRICULTURE, REVENUE, AND COMMERCE.

PAPERS RELATING TO THE CULTIVATION OF CHINCHONA AND THE MANUFACTURE OF QUININE IN INDIA.

Extract from the Proceedings of the Government of India in the Home Department (Public),—No. 645, under date Fort William, the 2nd February 1871.

READ again the following papers on the subject of the manufacture of quinine in India:

From the	Government of	Bengal	No. 478, dated 21st February 1870.
From	ditto	ditto	No. 3088, dated 4th November 1870.
To	ditto	ditto	No. 5524, dated 16th December 1870.
To	ditto	ditto	No. 5679, dated 24th December 1870.
From	ditto	ditto	No. 3232, dated 15th November 1870.
To	ditto	ditto	No. 5680, dated 24th December 1870.
To	ditto	of Madras	No. 5681, dated 24th December 1870.
From	ditto	ditto	(telegram), dated 19th January 1871.
To	ditto	of Bengal	No. 418, dated 21st January 1871.
From	ditto	ditto	No. 229, dated 23rd January 1871.
To	ditto	of Madras	(telegram), dated 24th January.

RESOLUTION.—Ever since the introduction of the cultivation of the cinchona plant in this country, the Government of India has watched with the deepest interest the progress of the experiment, feeling convinced that its success would be fraught with the most beneficial results to the whole population

of India. The advantages to be derived from the successful cultivation of cinchona cannot be over-estimated, as the object is to secure to the country at large the greatest medical boon that could be afforded to it, that is, to place within the reach of the masses of the people, at the lowest possible rates, the only effective specific that science has yet discovered for the commonest of Indian diseases.

2. That the cinchona plant, *C. Succirubra* at any rate, can be grown to any extent in British Sikkim has now been indisputably established by the results that have already been achieved at the Government plantations. And the Governor General in Council fully believes that at little present cost, and with a certainty of considerable future revenue, forests of cinchona may be reared in Sikkim which, by furnishing large quantities of quinine, may hereafter prove a blessing not only to India but to the civilized world.

3. Already the Government planations in Sikkim yield a considerable supply of excellent bark, and year by year a rapid increase in this supply may be looked for; the Governor General in Council, therefore, thinks that the time has come for a preliminary decision as to how this supply can best be utilized. This view of the case is confirmed by a very interesting report submitted by Mr. Clarke in regard to the experimental manufacture of amorphous quinine at Darjeeling. His Excellency in Council is of opinion that the best mode of settling the many doubtful points connected with this important question is the appointment of a commission to enquire into and report on the whole subject: and in communication with His Excellency the Governor of Madras and His Honor the Lieutenant-Governor of Bengal, he is pleased to nominate the gentlemen named in the margin to form the proposed commission.

Dr. Campbell Brown, *President.*
Mr. Clarke, } *Members.*
Dr. Simpson, }
Mr. Broughton, }

4. His Excellency in Council is well aware that any conclusions that may now be arrived at will doubtless need considerable modifications when a larger experience affords better data than at present exist. He is at the same time of opinion that it is essential to adopt without delay some regular system, the best that can be devised in the existing state of our knowledge, for dealing with the yearly increasing produce of the cinchona plantations.

5. The commission will have to consider, among other matters, whether, on general as well as economical grounds, it would be best—

(1) to send Home the whole of the bark which bears a marketable value; or

(2) to extract by a single process all soluble matter from the bark, and send Home the gross proceeds of the first precipitation; or

(3) to proceed further with the manufacture in India; and, if so, how much further; whether (*a*) only so far as is necessary to separate the several alkaloids from the resin, coloring matter, and other foreign elements which the first precipitate will contain; or (*b*) as far as the manufacture of the pure sulphate of quinine?

6. Should the commission recommend the second or third alternative, they will have to consider what processes will, under all the circumstances of the case, be most likely to prove appropriate.

7. A certain percentage of the total yearly yield of bark will, owing to its extreme poverty in alkaloids, always be unfit for the Home market; and it will be for the commission to decide how this bark may be most profitably dealt with here.

8. It is also believed that a valuable febrifuge can be readily extracted from the leaf of *some* species of the cinchona; and this point also, as well as many other kindred questions which will suggest themselves as the enquiry proceeds,

will appropriately form subjects for the consideration of the commission, whose sittings should be, in the first instance, in Calcutta, but who may later, if it be considered desirable, be deputed to visit the plantations themselves.

9. The commission will carry on their enquiries under the orders of the Lieutenant-Governor of Bengal, and will submit their final report to that authority.

ORDER.—Ordered, that a copy of this Resolution be forwarded to the Government of Bengal for information and guidance.

(True Extract.)

A. O. HUME,

Offg. Secy. to the Govt. of India,
Home Dept.

Extract paragraphs 4 and 5 of a letter from the Right Hon'ble the Secretary of State for India, to His Excellency the Right Hon'ble the Governor General of India in Council, —No. 28 (Public), dated India Office, London, the 4th April 1871.

4. THERE is one circumstance that should be borne in mind with reference to the bark trade. The supply of ordinary cinchona barks is practically unlimited from South America, and the only barks that will yield a permanently remunerative return, if imported from India, are those of the best description. The ordinary kinds of bark and that of *C. Succirubra*, will be suitable for the supply of amorphous quinine in large quantities for use in India; but bark intended for exportation should be of superior quality, such as would really meet the demands of the European markets. The efforts of cinchona cultivators in India, who merely undertake the work as a commercial speculation, should be turned to the production of barks having the richest yield of crystallizable quinine.

5. I observe, among the papers forwarded with your despatch dated 15th February 1871, a letter from the Honorary Secretary of the Darjeeling Cinchona Association, complaining that its members were induced to stake their capital in an undertaking in which they only expected competition with private individuals, while, in fact, they have been brought into ruinous competition with the Government itself. I have already expressed my opinion on this point to the Government of Madras. It should be clearly understood that the Government have no intention of embarking permanently in the bark trade. In sending their cinchona bark to the London market, one object is certainly to repay the cost of introduction and experimental cultivation of the plants; but the principal intention of the Government, in sanctioning this measure, is to act as a pioneer in establishing the reputation of Indian-grown barks, and not to injure the prospects of private planters, whose success would give the Government very great satisfaction..

From R. H. WILSON, ESQ., Officiating Under Secretary to the Government of Bengal, General Department, to the Secretary to the Government of India in the Home Department,—No. 1309, dated Fort William, the 8th May 1871.

WITH reference to the orders of the Government of India quoted on the margin, I am directed to forward herewith copy of a letter No. 1412, dated 30th March, from Dr. J. C. Brown, President of the Cinchona Commission, submitting with enclosures the report of the

Home Department, No. 645, dated 2nd February 1871.
Home Department, No. 467, dated 2nd February 1871.

commission on the results of the inquiry held by them into matters connected with the experimental manufacture of quinine at Darjeeling.

2. I am to add that the Lieutenant-Governor has been pleased to accept the recommendations of the commission, and has issued orders for giving effect to those contained in paragraphs 12, 17, and 20 of the report.

3. Upon the main question as to the advisabilty of a local manufacture of the stem bark into cinchona alkaloid, or the alternative of packing and drying the bark for despatch to England, the commission pronounce no definite opinion. The cost of a manufactory on the spot is still most uncertain, and for the next season's produce the Lieutenant-Governor has determined to act on the suggestion made by the commission, and to send Home for sale the bulk of the stem bark, reserving the inferior residue for the local manufactory. It has been ascertained that the manufacturing season will begin on the Rungbee Plantations by the middle of October, and enquiries are being made for a competent person to undertake the work.

4. The question of working the leaves of the cinchona may, as proposed in paragraph 19 of the report, await the result of the experiments in progress on the Neilgherries.

From DR. J. C. BROWN, Inspector General of Hospitals, Indian Medical Department, and President of the Cinchona Commission, to RIVERS THOMPSON, ESQ., Officiating Secretary to the Government of Bengal,—No. 1412, dated Fort William, the 30th March 1871.

I HAVE the honor to forward, for submission to His Honor the Lieutenant-Governor of Bengal, and ultimate transmission to the Supreme Government, the report of the cinchona commission appointed under Home Department Resolution No. 645 of 3rd February 1871, and convened under your letter No. 471 of the 18th of that month.

Proceedings of the commission, with Appendices A to H, accompany.

Report of the commission appointed by the Supreme Government of India (Resolution No. 645, proceedings of the Home Department, Fort William, 3rd February 1871) *to inquire how the supply of bark from the Cinchona Plantations in Sikkim might be best utilized, and into other matters connected therewith:*

WE are appointed to inquire, among other matters, how the supply of bark from the Government plantations at Rungbee, in British Sikkim, might best be utilized, and we received a separate instruction to examine Mr. McIvor, the Superintendent of the Government Cinchona Plantations in the Nilgherries.

2. We found that, as has been officially reported, *Cinchona Officinalis* has never grown well on the Government plantations in Sikkim, and is now largely dying out, and we recommend that what remains of it be cut during the present season, except a few experimental patches, which will serve, moreover, to supply seed. That portion of the bark which is worth carriage to England, and which will amount, perhaps, to 500lbs, may be sent for sale in London, and the twig bark may be worked up at Rungbee by the machinery now there.

3. We found that several years must elapse before any considerable supply of *Cinchona Calisaya* will be given by the Government plantations, and in the whole of the following report it will be understood that we refer to *Cinchona Succirubra* alone.

4. Mr. McIvor's examination was first taken. Mr. McIvor's opinion was that *Cinchona Succirubra* will never form a permanent forest plantation at

Rungbee; that, as a rule, it grows splendidly for the first two years, and, where there is a good depth of soil, for the first three years; but that as soon as it reaches the cold sub-soil it is attacked by canker, and that one in three of all the existing plants more than three years old will die out within the ensuing year, hence, that the quantity of bark now upon the plantation is greater than will ever be hereafter obtainable from the existing trees.

5. Though we were not appointed with the express object of inquiring into the cultivation and prospects of the Rungbee Plantation, yet it seemed to us that, unless some reply was furnished to the opinion of Mr. McIvor, it would appear almost frivolous to enter upon a difficult inquiry as to how certain bark should be worked up, while it seemed unlikely that such bark would ever be produced. We also considered that, after having added general terms to their instructions, Government would fairly expect that we should not pass, without investigation, such an opinion as that of Mr. McIvor—a most accomplished gardener, and of more experience in Indian cinchona culture than any other man.

6. We accordingly collected the opinions of all other competent and experienced persons whom we could reach. These witnesses differ widely among themselves as to the nature, cause, name, and number of the diseases found among the cinchona plants; but they all coincide upon the one point of vital importance, *viz.*, that *Cinchona Succirubra* is not likely to die out at Rungbee, but that it will form forest there, and yield from existing plants a continually increasing supply of bark.

7. It appears to us that in the case of the introduction of an exotic tree, its rapid propagation by cuttings, and its planting out under circumstances of soil and climate, which can hardly be supposed other than very different from those subsisting in its native land, it might be dangerous to predict absolutely whether the tree will stand ten or twenty years, far more so to assume that it will stand sixty or a hundred years, as it does in its indigenous state. We are nevertheless sanguine that no such complete failure and disappearance of the trees as that contemplated by Mr. McIvor is to be apprehended.

8. A small patch of trees, 374 in all, was planted out in 1864. Of these at least 100 died during the first year, and 230 are still alive, of which number about 90 were cut to the ground in December 1870 in the process of thinning; but diseased trees are stated to have been selected for thinning out. It therefore appears to us safe to entertain a strong expectation that the trees will stand seven or eight years; and should they stand no longer, a large supply of bark might be obtained by coppicing the plantations at that age.

9. It may be seen from Mr. McIvor's evidence that against this argument he would urge that in his opinion disease is rapidly increasing over the plantations, and that the present trees of three and four years old will not stand so long as those planted in 1864 and 1866 have stood. But, again, the opinion of the gardeners in charge of the plantations is unanimous that disease is not increasing on the plantations.

10. The reasons given by Mr. McIvor (in reply to questions Nos. 30 and 30* of his evidence—*vide* Appendix A, No. 1) for supposing that disease is now spreading on the plantations, do not appear to us to be satisfactory. We therefore have not thought ourselves relieved from the duty of carrying out the main instructions of Government, *viz.*, the inquiry how the future supply of bark at Rungbee may be best utilized.

11. The stems of a few trees have been attacked by borers, of which two kinds have been observed; also a caterpillar attacks the leaves. But we do not consider that either of these agricultural pests is present in such numbers as to cause anxiety.

12. We recommend that some method be adopted at Rungbee for obtaining every six months more exact statistics regarding the condition of the plantations.

The President, Dr. Simpson, and Mr. Broughton, agreed that a tabular schedule, somewhat like that given in Appendix G, might be adopted for a return of each year's planting, and that it was undesirable that the duty of filling these up should be entrusted to the gardeners only.

Mr. Clarke thought the form of schedule suggested by him, and given with his minute in Appendix H, would be better for the reasons therein given.

13. During the cold season of 1870-71 the Rungbee Plantations have produced about 12,500lbs. of dry bark of *Cinchona Succirubra*. Of this, 5,000lbs. of the best, which is expected to fetch 1*s*. 9*d*. per pound in London, has been despatched thither for sale, the remaining 7,500lbs. have been boiled down at Rungbee.

With regard to the stem bark which will be produced in 1871-72, the question of economical advantage between manufacturing it into cinchona alkaloid by Mr. Broughton's process on the spot, and the alternative plan of drying and packing it for sale in London, will ultimately depend on the cost at which such manufacturing process can be carried out on the large scale, and we do not feel that at present we are supplied with sufficiently exact data at Rungbee to enable us to report on this point.

14. We remark, for instance, that alcohol, 80 per cent. absolute, has cost from the Medical Store-keeper. Calcutta, ten annas per pound, and the carriage to Rungbee costs three annas per pound. Mr. Gammie has reported that, with the aid of the Coffey fractional still now at Rungbee, he can make alcohol, 80 absolute, from hill maize at a cost of 2½ annas per pound; and if this can be done on the large scale, an entirely new economic aspect would be given to the whole question under consideration.

15. We therefore recommend that the bulk of the stem bark be packed next cold season for sale in London, but that experiment on a considerable scale be made in manufacturing some of this bark at Rungbee, and that an accurate record of the outlay on manufacture at Rungbee be henceforth kept.

16. We recommend that the inferior bark be worked up at Rungbee.

The cost of working 1,000lbs. of bark is not materially different, whether such bark contains five per cent. of alkaloid or only ·5 per cent. of alkaloid; and hence the economic value of Mr. Broughton's process is hardly tested by trying it on the twig bark alone, from which all the finer bark has been picked out.

17. The President, Dr. Simpson, and Mr. Broughton, are strongly of opinion that the manufacture of cinchona bark, whatever process be adopted, ought not to be entrusted to other than a qualified person, and this opinion is much strengthened by the very serious admixture of copper found in the product last sent down from Rungbee. They are also of opinion that the present work by the two gardeners should be stopped immediately.

18. We are of opinion that it is of the highest importance that some method of working the bark without boiling (if such a method remains to be discovered in the case of young red bark) should be devised. We recommend that further investigation of the method of infusion, proposed by Dr. Simpson, be therefore carried out by a competent person.

19. Cinchona leaves do not appear to contain alkaloid in quantity at all likely to repay the expense of working. They contain quinovic acid to the extent of one or two per cent. their dried weight, which can be probably extracted and issued as quinovinates of lime and magnesia. The febrifugal value of these quinovinates has not yet been satisfactorily proved; their tonic

properties are established: they are also said to be useful in bowel complaints. The Madras medical authorities are now experimenting with such preparations furnished them from the Nilgherries by Mr. Broughton. Pending the result of these experiments, we do not recommend that any attempt to manufacture the quinovinates be engaged upon at Rungbee.

20. We learn that the Medical Store-keeper is still obtaining from Europe, at high prices, considerable quantities of red bark to be used in decoctions, &c. We recommend that the indents for red bark in future should be made upon the Rungbee Plantations. It is possible that, as red bark can be furnished thence at very small cost, the employment of such decoctions may be extended advantageously in the Government medical service.

21. We have appended a very full report of our proceedings and discussions, with appendices containing the examinations of the witnesses, and various others papers, so that the whole of the information upon which our report is grounded is thus placed at the disposal of Government for reference. We have, therefore, supposed a long report unnecessary, and hope the present will supply a convenient summary of the results which we have been able to arrive at.

J. CAMPBELL BROWN,
Offg. Inspr. Genl. of Hospitals. } *President.*

C. B. CLARKE,
Offg. Supdt., Botanic Garden, Calcutta.

B. SIMPSON, M. D.,
Civil Surgeon of Patna. } *Members.*

JOHN BROUGHTON,
Govt. Quinologist, Madras.

APPENDIX A.

Examination of Witnesses.

THE questions put to the witnesses were framed with the sole object of eliciting the desired information in the most direct way, and some questions were put by individual members of the commission as the examination proceeded.

No inference, therefore, must be drawn from the wording of the questions as to the opinion which the commission accepted on any contested point.

APPENDIX A.—No. 1.

Examination of Mr. McIVOR, *who has had the direction of the Government Cinchona Plantations in the Nilgherries from* 1860 *to the present time.—(taken* 28*th February* 1871).

ARE you of opinion that *Cinchona Succirubra* can be grown to any extent in British Sikkim?—It can be grown to any extent.

2. Are the plants of *Cinchona Succirubra* likely to attain the size of forest trees?—From the appearance of the plants I do not think that they will form at Rungbee and Rishap a permanent forest plantation. The majority of the plants are now diseased, and thousands of them have already died of canker. As a rule, the plants have grown splendidly during the first two years, and in places where the surface soil is deep during the first three years.

On patches of damp land they have not grown at all. The disease among the plants appears to me to be caused by the roots getting into a cold, damp sub-soil.

Have you any of this canker on your plantations in the Nilgherries?—Yes; but to a very limited extent.

Then you consider the condition of the Nilgherry *C. Succirubra* Plantations to be more healthy than that of the plantations here?—Yes; certainly.

Is the average vertical growth during the first three years of the *C. Succirubra* trees in Sikkim greater than in the Nilgherries?—A few exceptional plants have a much greater growth here, in Sikkim, than any in the Nilgherries, but the average growth at the Nilgherries is greater than in Sikkim even during the first three years.

What do you suppose to be the cause of the great growth of the few exceptional plants?—It appears to be due to their having been planted over pits that have been made by the natives in digging for the roots of wild yams, and that have been afterwards washed in with fine vegetable mould.

17. May a rapid increase in the supply of bark be looked for from existing plants?—No; I think the plantations would yield more bark now than ever they will hereafter. If this question refers to the plantation of from four to six years' growth, the greater quantity of bark will be produced by cutting them down now, because the disease is rapidly destroying the plants. My impression is, that there are 100,000 Plants of the age above-mentioned which will die before the end of this year.

20. What do you consider the best means of drying the bark for export?—My limited experience leads me to suppose that the bark would be best dried as rapidly as possible in the sun.

I dried some bark in an oven, and some in the sun, taken from the same tree and of the same quality, which I sent to Mr. Howard, who found about a third more crystallizable alkaloid in the former than in the latter. I learn from Mr. Broughton that exposing the bark to too high a temperature renders the alkaloids uncrystallizable.

23. Should Government wish to extend the plantation, what species of cinchona will grow best?—It does not seem to be established which species will be the most profitable to grow. The red-bark plant is the most luxuriant, both here and on the Nilgherries.

25. What are the merits of the adjoining plantation of the Darjeeling Cinchona Association at Pomong, as compared with those of the Government Plantation?—The Pomong Plantation appears to be in as good a condition as the Government Plantation.

26. We learn that a large proportion of the trees of the Pomong Plantation were cut down last year; do you think that the plantations are thereby rendered less valuable?—The plantations may be benefited by the cutting down, as all, or nearly all, the stumps appear to have been cankered. These stools are now throwing fine vigorous shoots which promise to be free of canker for two or three years at least. If the canker is allowed to advance too far before the trees are cut down, they do not throw strong shoots from the stumps, and many of them die altogether.

30. Do you consider the canker to be spreading in the plantation?—The canker appears to me to be rapidly spreading. It is met with in all stages of development on the plants. Many plants which are now sickly must have been healthy three months ago. It appears to me that, when the roots penetrate the cold sub-soil, canker makes its appearance, and the tree subsequently makes no healthy growth.

30*. Can you give more fully your reasons for believing that the canker is now spreading in the plantations?—I judge from the fact that the young trees are healthy; that the trees of from four to seven years' growth must

have been healthy in the early stages of growth from the fact that, where the sub-soil is near the surface, the canker sets in and destroys plants long before those on a deeper surface soil are affected; from the fact that the roots in the lower sub-soil are decayed at their points, while the roots in the upper soil are still fresh and vigorous.

30* *. You have stated that, during the first two or years, the plants are healthy, and grow vigorously; do you not consider it possible that the canker in the older plants may be due to the fact of over-propagation in the first instance?—It appears to me that the canker arises from the roots entering the cold sub-soil.

31. Can you suggest any remedy for the state of canker?—It is difficult to apply a remedy to canker, because the cause generally lies in the soil. Deep cultivation, large pits filled in with surface soil, and deep draining might have a good effect, but would not in any way tend to make the cultivation profitable. This canker also exists in Java, and in the plant in the natural forests of South America, where seedlings which germinate in low, damp places generally die out in the third or fourth year.

31*. Do you consider that what you have said respecting *C. Succirubra* applies to *C. Calisaya* also?—In every respect, so far as I can judge from so small a number of plants.

APPENDIX A, No. 2.

Re-examination of Mr. McIvor *immediately after the Commission had been accompanied by him through the plantation.—(Taken 4th March* 1871).

You stated in your reply to question 17 *supra*, that your impression was that 100,000 plants of from four to six years' growth would die before the end of this year; what do you mean by a plant of four years' growth?—I meant a plant that had entered on its fourth season of growth.

Are we to understand from what you have said that you consider the soil and climate of British Sikkim to be unsuited to the growth of *C. Succirubra* and *C. Calisaya*?—It is rather difficult for me to say. My impression is that a better soil would have produced better and finer plants. As for the climate, I have no knowledge of it. Sikkim is, however, beyond the Tropic, and I believe that in South America cinchona is not found without the Tropics; but I consider this is no reason that the plants may not do well, provided the sub-soil is open and dry.

APPENDIX A, No. 3.

Examination of Mr. Gammie, *who has been in charge of the Government Cinchona Plantations as Head Gardener since January* 1866.—*(Taken 28th February* 1871).

1. Are you of opinion the *cinchona succirubra* can be grown to any extent in British Sikkim?—I am of opinion that it can be grown to any extent.

2. Are the plants of *cinchona succirubra* likely to attain the size of forest trees?—Yes.

3. Can they be grown at little cost?—Yes.

4. Can they be grown with a certainty of future revenue?—I reserve my opinion on this point.

5. Why do you reserve your opinion on this point?—Because I am doubtful of the bark retaining its present price.

6. Why do you conclude that they can be grown to any extent and at little cost?—Because labor is cheap, and the land is easily cleared, and plants are produced cheaply.

7. Do you think that disease exists among the *C. Succirubra* plants; and if so, to what extent? Yes, disease exists in some part of the plantations, and not in others.

8. What is the disease?—Canker.

9. Have not a number of plants already died?—No, not one in a thousand has died yet of canker; but plants have died out in considerable quantities from bad drainage.

10. There is a marked difference in the growth of the trees; to what do you ascribe this?—To difference in soil.

11. You are aware, I suppose, that natives dig for yams in these parts, leaving large holes open; have many trees been planted in such holes filled up with good earth, and do you think that this may account for the difference alluded to? Natives have dug for yams, but this occasions no difference in the plants. The yam-pits are rare; there are frequently ten acres without a yam-pit.

12. What depth are the yam-pits?—From two to five feet.

13. The vertial growth of the trees is great during the first three years; is this rate of growth as in the second and third subsequently maintained?—Yes; trees of five years' growth have grown as well in the fourth and fifth year as in the second and third.

14. What is the cause of the canker in the plant?—I attribute it to hard propagation so that the stock got weakened. It may be partly due be cold soil, so that the plants got weakened.

15. What do you mean by a cold soil?—A soil that retains the moisture.

16. Do you consider cold soil exceptional, or is it general over the plantation? I consider it exceptional.

17. May a rapid increase in the supply of bark be looked for from existing plants?—Yes.

18. How many plants were planted out by the end of 1866?—31,387.

19. Within what period do you expect the cankered plants to die?—They will not die. If a tree be affected with canker, and the top be cut away, it will shoot out again and become a forest tree.

20. What do you consider the best means of drying the bark for export?—The only way I have done it is to dry it in the air, and then finish over charcoal.

21. What is the cost of drying and packing 1,000 lb?—About Rs. 50.

22. Would packing in gunny bags be cheaper than in boxes?—I do not know the price of gunny bags.

23. Should Government wish to extend the plantations, what species of cinchona will grow best?—*Cinchona succirubra*; it is the hardiest plant, and will grow any were. *C. Calisaya* requires its site selected.

24. Do you know the adjoining plantation of the Darjeeling Cinchona Association at Pomong?—Yes.

25. What are the merits of that plantation as compared with those of the Government plantations?—Equal, as they stand.

26. We learn that a large proportion of the trees of the Pomong plantation were cut down last year; do you think that the plantations are thereby rendered less valuable?—Yes; for the present.

27. Do you think it would be advisable to cut the Government plantations more severely than heretofore?—At the end of four years every plant not likely to make a good tree should be cut down.

28. What do you mean by a plant that is not likely to make a good tree?—Every tree which is cankered, or hide-bound, or stunted, or wants a leader.

29. Do you consider a cankered tree and a hide-bound tree in different stages of the same disease?—No.

30. Do you consider the canker to be spreading in the plantation?—Certainly not. It is diminishing, because we have got a healthier stock.

31. Can you suggest any remedy for the state of canker?—Cut them down.

32. Would cutting down all the cankered trees leave enough standing to form a forest?—Over nine-tenths of the plantation, it would.

33. Do you consider the canker a consequence of planting in wet places?—No.

34. Do you consider *Cinchona Calisaya* to be more liable to disease than *Cinchona Succirubra?*—I have not sufficient experience.

35. From the experience you have had, do you consider the plants of *Cinchona Calisaya* promising?—Yes; in well selected places.

36. What are the conditions which you consider necessary for the growth of *Cinchona Calisaya?*—An altitude not exceeding 3,000 feet, a moist and shady situation, and good soil.

37. You have stated that the Pomong plantation has been rendered less valuable for the present: do you consider that it will become more valuable hereafter; and if so, why?—Yes: because I believe the shoots from the stools of the plants that have been cut down will make better trees than the original plants would have done.

APPENDIX A, No. 4.

Re-examination of MR. GAMMIE.—(*Taken 6th March* 1871.)

38. You were present when Mr. McIvor pointed out to the Commission the existence of canker both in the young and in older plants of *C. Succirubra* and explained his views concerning it; has your opinion regarding the permanence of the plantation been thereby modified?—No; my opinion is the same as before, because in the earlier planting of 1864 and 1866 the disease—if it is to be called a disease—was much worse than it is now.

APPENDIX A, No. 5.

Examination of MR. KENNEDY, *who has been 2nd Gardener on the Government Cinchona Plantation since February* 1867.—(*Taken 2nd March* 1871.)

1. ARE you of opinion that *Cinchona Succirubra* can be grown to any extent in British Sikkim?—Yes; I think so.

2. Are the plants of *Cinchona Succirubra* likely to attain the size of forest trees?—Yes.

3. Can they be grown at little cost?—Yes.

4. Can they be grown with a certainty of future revenue?—I think they ought to give a good revenue.

6. Why do you conclude that they can be grown to any extent and at little cost?—Because the other slopes in the neighbourhood are as good as those at Rishap, and when the plants grow up they will require comparatively little labour.

7. Do you think that disease exists among the *cinchona succirubra* plants; and if so, to what extent?—Yes, some of them are diseased; about one-eighth.

8. What is the disease?—Canker.

9. Have not a number of plants already died?—Yes, about 4 per cent. of the first hundred acres I planted have already died. They have not all died of canker. Some have died of damp sub-soil.

10. There is a marked difference in the growth of trees; to what do you ascribe this?—To difference in soil.

11. You are aware, I suppose, that Natives dig for yams in these parts, leaving large holes open; have many trees been planted in such holes filled up with good earth; and do you think than this may account for the difference alluded to?—I know that the Natives have dug for yams. I have only seen one cinchona plant put in a yam hole.

13. The vertical growth of the trees is great during the first three years; is this rate of growth subsequently maintained?—Yes.

14. What is the cause of the canker in the plant?—Hard propagation may have something to do with it.

14**. Do you not consider it possible that a wet sub-soil might induce canker in a healthy seedling?—It might, but such a sub-soil would never grow a healthy plant, though it might not cause canker.

16. Do you consider cold soil exceptional, or is it general over the plantation? I consider it exceptional.

17. May a rapid increase in the supply of bark be looked for from existing plants?—I do not think any increase in the supply must be expected next year. The year after that it will be very considerable. I do not see why it should not continue to increase afterwards.

17*. Why will not the yield of bark be increased next year?—Because there was no such large amount planted in 1868, and a number of vacancies occurred which were not filled up immediately.

19. Within what period do you expect the cankered plants to die?—I cannot say that I have ever seen them die of canker only in good soil. Cankered plants will die above the canker, but will spring up again from the roots, and this second growth may become a tree.

20. What do you consider the best means of drying the bark for export?—In the sun, or else under sheds so arranged that the air may pass freely through. It will then get perfectly dry in the months of October, November, February, March and April.

23. Should Government wish to extend the plantations, what species of cinchona will grow best?—*Cinchona Succirubra*, because it is more easily propagated than *C. Calisaya;* but when once planted out, I do not think *C. Calisaya* will be more troublesome.

24. Do you know the adjoining plantation of the Darjeeling Cinchona Association at Pomong?—Yes.

25. What are the merits of that plantation as compared with those of the Government plantation?—There is little difference between them.

26. We learn that a large proportion of the trees of the Pomong Plantation were cut down last year; do you think that the plantations were thereby rendered less valuable?—No; I think they were benefited, for a number of the trees cut down were cankered, and the shoots springing from the stools are quite healthy.

27. Do you think it would be advisable to cut the Government plantations more severely than heretofore?—No; I would only cut cankered trees. There is no need to cut healthy trees.

29. Do you consider a cankered tree and a hide-bound tree in different stages of the same disease?—No.

29*. Are you acquainted with the plan of slitting up the bark of a hide-bound tree?—Yes; I approve of it.

30. Do you consider the canker to be spreading on the plantation?—It is not decreasing, at any rate.

30*. Are we to conclude therefore that it is increasing?—No; I think it is about the same.

In the first year that I was here, I do not think that I observed canker at all in the plantation. The second year it made its appearance, and the third year it got worse. The fourth year it has not increased.

31. Can you suggest any remedy for the state of canker?—No.

32. Would cutting down all the cankered trees leave enough standing to form a forest?—Yes; I think so.

33. Do you consider the canker a consequence of planting in wet places?—No.

34. Do you consider *Cinchona Calisaya* to be more liable to disease than *C. Succirubra*?—No.

35. From the experience you have had, do you consider the plants of *Cinchona Calisaya* promising?—Yes.

36. What are the conditions which you consider necessary for the growth of *C. Calisaya*?—The same as for the growth of *C. Succirubra*.

42. Of the plants of 1866 planting, how many have died?—There were about 25,000 standing of previous years' planting when I came here in 1867; of these about 2,500 have died. About half of the trees have been cut. They have died out in patches.

You say there were about 25,000 trees in permanent plantation when you first came here in 1867, of which about half have been cut, and about 2,500 are dead. Some 10,000 plants will remain, of these what percentage do you expect will die in the course of the next three years?—About 3 per cent.

APPENDIX A, No. 6.

Examination of MR. JAFFREY, *the 3rd Gardener, who has been in the Government Cinchona Plantations since* 1862.—(*Taken 2nd March* 1871.)

1. ARE you of opinion that *Cinchona Succirubra* can be grown to any extent in British Sikkim?—Certainly.

2. Are the plants of *Cinchona Succirubra* likely to attain the size of forest trees?—I believe they can be grown into forest trees.

3. Can they be grown at little cost?—I cannot speak as to cost.

4. Can they be grown with a certainty of future revenue?—I think it ought to yield a large revenue.

7. Do you think that disease exists among the *Cinchona Succirubra* plants; and if so, to what extent?—Yes, they are diseased to a considerable extent. The disease does not exceed 20 per cent.

8. What is the disease?—Canker.

9. Have not a number of plants already died?—Very few.

10. There is a marked difference in the growth of the trees; to what do you ascribe this?—To portions of land that have not been so severely cultivated by squatters. The bamboo jungle has never been cultivated, and on this the trees are luxuriant.

11. You are aware, I suppose, that natives dig for yams in these parts, leaving large holes open; have many trees been planted in such holes filled up with good earth, and do you think that this may account for the difference alluded to?—No; it has nothing whatever to do with it.

13. The vertical growth of the trees is great during the first three years; is this rate of growth subsequently maintained?—Very nearly.

14. What is the cause of the canker in the plant?—Moisture, I believe, and bad ventilation.

14.* You had charge of the plants at Lebong in 1863 before any were planted out from the nursery, the canker then appeared; to what do you attribute this?—To moisture and over-propagation.

14.** Do you not consider it possible that wet sub-soil might induce canker in a healthy seedling?—Yes.

16. Do you consider cold soil exceptional, or is it general over the plantation?—It is exceptional.

17. May a rapid increase in the supply of bark be looked for from existing plants?—Yes.

19. Within what period do you expect the cankered plants to die?—They must be cut to the ground, and then they will live. If a branch only is cankered, the branch only need be cut.

20. What do you consider the best means of drying the bark for export?—I cannot give an opinion.

23. Should Government wish to extend the plantations, what species of cinchona will grow best?—*Cinchona Succirubra* and *C. Calisaya*. What *C. pitayensis* will be, I do not know.

24. Do you know the adjoining plantation of the Darjeeling Cinchona Association at Pomong?—Yes.

25. What are the merits of that plantation as compared with those of the Government plantations?—Nearly equal; the Government plantations being the better in general appearance. This is to be attributed to aspect.

26. We learn that a large proportion of the trees of the Pomong Plantation were cut down last year; do you think that the plantations are thereby rendered less valuable?—No, I do not: the growth is rapid from the stools and superior to the original growth.

27. Do you think it would be advisable to cut the Government plantations more severely than heretofore?—Yes.

29. Do you consider a cankered tree and a hide-bound tree in different stages of the same disease?—They are decidedly different diseases.

30. Do you consider the canker to be spreading in the plantations?—I consider it to be diminishing. Formerly we had it everywhere, both in the nursery stock and in the cuttings.

30.* You stated that in your opinion canker was caused by moisture and bad ventilation; these causes remain in operation now as before; to what then do you attribute the diminution of the canker?—To a change in the manner of propagation by treating the young cuttings in a more hardy manner, and not under glass.

34. Do you consider *Cinchona Calisaya* to be more liable to disease than *C. Succirubra*?—No; it is less liable, being a less soft plant than *C. Succirubra*.

35. From the experience you have had, do you consider the plants of *Cinchona Calisaya* promising?—Yes.

35.* Are the plants of *Cinchona Calisaya* likely to die?—A few exceptional plants may die.

39. Supposing that you were to take a plant indigenous to the soil and propagate it by seedlings and cuttings, and plant it six by six over the Rungbee valley, would you expect it to be more uniform than *C. Succirubra*?—No.

44. Of the older plants now growing on Rungbee, what proportion do you expect may die from canker and other causes within the next three years?—I do not believe that any except a few tops will die.

APPENDIX A, No. 7.

Examination of MR. BIERMANN *who came as a gardener to the Rungbee Plantation in the spring of* 1865, *then had charge of the Government Cinchona Plantations in the Khasi Hills from February* 1867 *to August* 1870, *and since then has been re-transferred to Rungbee in charge of the manufactory.—(Taken* 3rd *March* 1871*).*

1. ARE you of opinion that *Cinchona Succirubra* can be grown to any extent in British Sikkim?—Yes.

2. Are the plants of *Cinchona Succirubra* likely to attain the size of forest trees?—Yes.

3. Can they be grown at little cost?—I prefer to say nothing about the cost.

4. Can they be grown with a certainty of future revenue?—The revenue will depend upon circumstances.

7. Do you think that disease exists among the *Cinchona Succirubra* plants; and if so, to what extent?—Yes; some plants are diseased. I cannot state what proportion, because I have not lately been working in the plantations.

9. Have not a number of plants already died?—Yes; I have no idea of the number.

10. There is a marked difference in the growth of the trees; to what do you ascribe this?—To the nature of the ground.

11. You are aware, I suppose, that the natives dig for yams in these parts, leaving large holes open; have many trees been planted in such holes filled up with good earth, and do you think that this may account for the difference alluded to?—Yes; such yam holes are dug, and an exceptional cinchona tree may be affected; but one may walk a mile over the ground not planted and not see a yam hole.

13. The vertical growth of the trees is great during the first three years; is this rate of growth subsequently maintained?—The rate of growth may diminish; the subsequent rate of growth may be a little less than during the first three years.

14. What is the cause of canker in the plant?—Excess of moisture both in atmosphere and in the soil.

16. Do you consider cold soil exceptional, or is it general over the plantation?—It depends on the slope of the ground and the nature of the soil.

17. May a rapid increase in the supply of bark be looked for from existing plants?—Yes; because the growth is good, and in the older trees the bark increases in thickness.

19. Within what period do you expect the cankered plants to die?—If badly affected they may die quickly; if not so, they may recover. I have seen cankered plants take on healthy bark.

23. Should Government wish to extend the plantations, what species of cinchona will grow best?—*C. Succirubra*, without doubt, because it is a rapidly growing tree. I have, however, not had much experience of *C. Calisaya*.

24. Do you know the adjoining plantation of the Darjeeling Cinchona Association at Pomong?—Yes.

25. What are the merits of the plantation as compared with those of the Government plantations?—Just equal. I can perceive no difference.

26. We learn that a large proportion of the trees of the Pomong Plantation were cut down last year; do you think that the plantations are thereby rendered less valuable?—It cannot much make difference, since from what I have seen in those places where the trees have been cut, there are enough left to cover the ground within a short time.

27. Do you think it would be advisable to cut the Government plantations more severely than heretofore?—No; the present cutting is now sufficient.

29. Do you consider a cankered tree and a hide-bound tree in different stages of the same disease?—No; I think they are different diseases. I do not think the disease seen in the cinchona trees is the same as that known as canker in Europe, but I am not sure on this point.

30. Do you consider the canker to be spreading in the plantation?—No; I do not. I consider it to be diminishing.

In 1865 about 380 plants had been planted out in permanent plantation, and I was told that these were all unhealthy when put out the preceding year. After the rains sixty died at one time and more died shortly afterwards, some recovered. If this rate of death had continued, 75 per cent. of these plants would now be missing, whereas I have now examined closely and find 236 alive.

If the canker had been equally fatal in succeeding years in other parts of the plantation as it was in 1865, the plantations would show gaps even if the vacancies had been filled up.

31. Can you suggest any remedy for the state of canker?—No; but I would cut cankered trees down below the cankered spots, and I would avoid planting where there is no natural drainage.

Of the older plants now in the plantations, few, if any, will die where there is drainage; where there is no drainage, more will die.

31.* Do you consider the natural drainage of the plantation to be good or bad, speaking generally?—Good, as a whole.

39. Supposing that you were to take a plant indigenous to the soil and propagate it by seedlings and cuttings, and plant it six by six over the Rungbee valley, would you expect it to be more uniform than *C. Succirubra*?—No; I should not.

APPENDIX A, No. 8.

Examination of Mr. Spicer, *the 4th Gardener on the Government Cinchona Plantations, who has been continuously employed there since July* 1865.—*(Taken 3rd March* 1871.*)*

Are you of opinion that *Cinchona Succirubra* can be grown to any extent in British Sikkim?—Yes.

2. Can the plants of *Cinchona Succirubra* be grown at little cost?—Yes; and at a very much less cost than heretofore.

7. Do you think that disease exists among the *Cinchona Succirubra* plants; and if so, to what extent?—Yes; there is one or two here and there cankered; about 2 or 3 per cent.

9. Have not a number of plants already died?—One or two here and there have died, but there are few vacancies.

10. There is a marked difference in the growth of the trees; to what do you attribute this?—To difference of soil.

11. You are aware, I suppose, that natives dig for yams in these parts, leaving large holes open; have many trees been planted in such holes filled up with good earth, and do you think that this may account for the difference alluded to?—There are lots of yam holes, but this does not account for the difference in the growth of the trees.

13. The vertical growth of the trees is great during the first three years; is this rate of growth subsequently maintained?—Yes.

14. What is the cause of the canker in the plant?—Harsh and gravelly soil.

16. Do you consider the harsh soil exceptional, or is it general over the plantation?—It is not general.

17. May a rapid increase in the supply of bark be looked for from existing plants?—Yes; certainly.

30. Do you consider the canker to be spreading in the plantation?—No.

30*. Must a plant which is cankered die?—Some die, some live.

APPENDIX A, No. 9.

Examination of MR. MUNRO, *who has been in charge of the Cinchona Plantations of the Darjeeling Association at Pomong, as Head Gardener since December* 1863; *had fifteen years' experience as a Gardener and Forester in Europe, and was trained three and-a-half years in the Edinburgh Botanic Garden.—(Taken 6th March* 1871.)

ARE you of opinion that *cinchona succirubra* can be grown to any extent in British Sikkim?—Yes; decidedly.

2. Are the plants of *cinchona succirubra* likely to attain the size of forest trees?—I expect them to grow to the height of 30 feet at least. I do not see why they should not grow as high as in their native land, when we grow them from seedlings: but my present plantation of 5,00,000 have been raised by cuttings from ninety-two plants, and we hardly expect forest trees raised by cuttings to grow to a large size. By the rapid propagation at first here practised, the constitution of the plants was weakened.

3. Can they be grown at little cost?—Yes, they can be grown at very little cost. We merely make a hole in the ground and stick a plant in.

4. Can they be grown with a certainty of future revenue?—At present prices it can be grown to a profit.

7. Do you think that disease exists among the *c. succirubra* plants; and if so, to what extent?—There is no disease whatever except canker, which is hardly worth calling a disease.

In former years' planting it was heavy, say 5 per cent. or more in the 1866 planting; in later years' planting, it is much lighter, say 1 per cent. in the 1869 planting.

9 Have not a number of plants already died?—I cannot say that any have died of canker only; some may have been broken across by canker very low down, but generally they have thrown fresh healthy shoots from the root.

10. There is a marked difference in the growth of the trees; to what do you attribute this?—To some plants being stronger in constitution than others when planted, and to some plants getting into better soil than others.

11. You are aware, I suppose, that natives dig for yams in these parts, leaving large holes open: have many trees been planted in such holes filled up with good earth, and do you think this may account for the difference alluded to?—Yes, there are yam holes, but we do not fill them up, nor do we plant in them.

If a plant got into a yam hole filled up with good earth, it would very probably grow well; but not one plant in a hundred can be so situated.

13. The vertical growth of the tree is great during the first three years; is this rate of growth subsequently maintained?—As far as I have seen, the rate of growth is maintained.

14. What is the cause of the canker in the plant?—Hard propagation; the canker is helped on if the plant gets into poor soil or into a place where the water stagnates. Numbers of plants die out from wet soil, but this has nothing to do with canker, from which such plants may be quite free.

16. Do you consider the wet soil to be exceptional, or is it general in the Rungbee valley?—A wet subsoil is exceptional, the drainage is in general good.

17. May a rapid increase in the supply of bark be looked for from existing plants?—Yes; most decidedly.

19. Within what period do you expect the cankered plants to die?—I do not expect the cankered plants to die. I cut them over and generally obtain healthy shoots.

20. What do you consider the best means of drying the bark for export?—We are drying our bark under sheds and finishing over charcoal.

21. What is the cost of drying and packing 1,000lb?—Roughly Rs. 26; that is, exclusively of taking the bark off the trees, which costs nearly as much more. (A note subsequently given the Secretary by Mr. Munro.)

22. Would packing in gunny bags be cheaper than packing in boxes?—I do not know the price of gunny, but I should think it would be cheaper.

23. Should it be wished to extend the plantations, which species of chinchona will grow best?—*C. succirubra.* I have very little experience of *c. calisaya;* but so far as I have seen it in the Government plantations, *c. calisaya* may do as well as *c. succirubra.*

29. Do you consider a cankered tree and a hide-bound tree in different stages of the same disease?—No.

31. Can you suggest any remedy for the state of canker?—Cut them down and get young shoots from the stools.

34. Do you consider *cinchona calisaya* to be more liable to disease than *cinchona succirubra*?—No; so far as I have seen, I have little experience of *c. calisaya.*

39. Supposing that you were to take a plant indigenous to the soil and propagate it by seedlings and cuttings, and plant it six by six over the Rungbee valley, would you expect it to be more uniform than *c. succirubra*?—No, you have only to look in the jungle, and you will see that any trees, as the *chelonis*, will grow in one class of situation and avoid another, as the soft places.

40. Do you see a difference between your plants from cuttings and those from seeds in growth and healthy appearance?—No.

41. You have stated you have canker: is it among the plants raised from cuttings only, or is it also among those raised from seed?—Among both.

I raised two years ago a large quantity of plants from Ceylon seed, these are now nearly free from canker.

Our own seedings were mostly raised from seed of cankered trees, and they also exhibit canker, but the seedlings which I am now raising from seed of sound trees I expect to exhibit little canker. From the state of cuttings which I have received from Ceylon, I infer that in Ceylon they were propagating much less severely than we do.

We received our first cuttings from the Nilgherries, and these were extensively affected with canker.

APPENDIX A, No. 10.

Examination of MR. SCOTT, *Curator of the Calcutta Botanic Garden.*—(*Taken 17th March* 1871).

You have been educated as a horticulturist, where?—At the Botanic Gardens, Edinburgh, under Dr. Balfour and Mr. McNab.

You have, we understand, conducted many important and delicate investigations in vegetable physiology: can you particularize any of these?—My investigations have principally been in structural anatomical investigations of the higher cryptogams.

I have also carried out a number of biological experiments for Mr. Darwin: my papers describing the detailed results of these are printed partly in the publications of the Linnœan Society of London, partly in those of the Edinburgh Botanic Society.

When were you put in charge of the cinchona plants at Rungbee?—In January 1865.

How long did you retain charge?—Till May 1865.

Was there any disease at that time among the cinchona plants?—Yes; I observed a disease in the bark. It was not very prevalent, but I occasionally observed it. It was exhibited not only in the plantation, but also in the pot-culture, and in the nursery beds.

What was the nature of that disease?—It first presented itself as a discoloration of the bark and a softening of the cellular tissue; a communication of it inwards, discoloring the wood opposite, ensued.

So far as the process extended, the tissues and the wood had their vitality completely destroyed.

Did you examine closely the diseased plants?—Very closely, and the items most particularly.

What conclusions did you come to concerning the cause of this disease?—The cause appeared to me to lie in the atmosphere rather than in the soil. I noticed that the disease broke out especially after several days' continued rain, and seemed to me caused by a saturated state of the atmosphere inducing suppressed transpiration and a local decomposition of the sap. Then follows a transfusion of the diseased juices into the adjoining parts of the wood. The disease is intensified by a moist state of the soil, but in my opinion does not originally proceed from the soil.

Have you visited the Sikkim cinchona plantations since 1865?—It was in 1866 and again in 1868 for three weeks or a month on each occasion.

You may have heard that doubts have been raised whether *cinchona succirubra* will grow into a forest in Sikkim; are you able to offer any opinion on this point?—So far as I have had opportunity of observation, I see no reason to doubt that it will. I think the disease will gradually disappear as the plantation gets thinned.

10. There is a marked difference in the growth of the trees; to what do you ascribe this?—To the circumstances of the soil.

16. Do you consider cold soil exceptional, or is it general over the plantation?—Exceptional.

29. Do you consider a cankered tree and a hide-bound tree in different stages of the same disease?—Certainly not.

29.* Is there more than one form of disease among the cinchona plants?—The above is the only form of disease that I observed as sufficiently common to merit attention.

31. Can you suggest any remedy for the state of canker?—I do not consider the disease which I have been describing to be canker at all. Canker arises from a wet subsoil, and may be cured by removing the cause.

Canker proceeds from the root; the disease in the cinchona plant proceeds from the eaves. The early stage of the disease in the cinchona plants in no wise resembles canker. It first appears as a minute patch on the bark, as if a drop of nitric acid had been placed on the plant at that point.

Do you consider that a cinchona tree diseased as above described must die?—When the disease extends circularly round the stem, the portion above the diseased ring must die, not the portion below; when the disease spreads longitudinally, the plant may heal up.

34. Do you consider *cinchona calisaya* to be more liable to disease than *cinchona succirubra?*—So far as my experience goes, *cinchona succirubra* is the more liable to disease; but there was very little *c. calisaya* at Rungbee when I last visited there.

39. Supposing that you were to take a plant indigenous to the soil, and propagate it by seedlings and cuttings, and plant it six by six over the Rungbee valley, would you except it to be more uniform that *c. succirubra?* I do not think that any plant would stand uniformly over such a place. Some of the ground planted in 1868 were mere marsh.

It has been suggested that the disease in the *cinchona* plant has been induced by over-propagation; do you at all admit this view?—Severe propagation will weaken the stock, but the cuttings even from weakened stock plants, if placed under favorable circumstances, will be as vigorous as the direct progeny of seeds.

In taking cuttings, would you willingly propagate from a cankered stock plant?—As readily as from a healthy plant, provided I could find a healthy shoot to make a cutting of. I took on this disease as entirely a local affection.

APPENDIX A, No. 11.

Examination of MR. MANN, *Assistant Conservator in the Bengal Forest Department.—(Taken 25th March* 1871.)

WERE you educated as a gardener?—I was educated as a gardener in Brunswick, and subsequently in many places—all over the Continent of Europe, indeed.

Did you come out to India to take charge of the cinchona plantations; and at what date?—I came out in April 1864, and I went up to Sikkim. The cinchona plants were then mainly at Lebong, whither they had been removed from Sinchul. When I arrived, Rungyroong was the nursery. Rungbee was totally uncleared, and during that summer we made a commencement of clearing and planting at Rungbee.

How long did you retain charge of the cinchona?—Until Mr. Gammie came out, in 1866. I remained in British Sikkim as a forest officer up to November 1868, and during such time frequently had opportunities of visiting the cinchona plantation.

Was there any disease among the cinchona plants in 1864?—Yes.

What was the nature of that disease?—A disease in the bark, and it formed furrows in the bark up and down the stem; not round patches. The disease I should hardly call canker; it is a stoppage of the sap only. The disease in the bark of cinchona I have frequently seen to heal up.

Did you examine closely the diseased plants?—At that time frequently.

What conclusions did you come to concerning the cause of this disease?—Pressure of propagation, the exceeding artificial rapidity with which the plants were multiplied. More particularly I attribute the disease to the treatment under propagation. We forced the young plants in frames very hard and planted them out suddenly.

You may have heard that doubts have been raised whether *cinchona succirubra* will grow into a forest in Sikkim; are you able to offer any opinion on this point?—Forest is a vague term; they seem to be forest now. If by forest is understood trees of 30 to 40 feet, I think they will quite grow up to that.

10. There is a marked difference in the growth of the trees; to what do you arttribute this?—The same difference is always observed in plantations on a large scale as in our forest operations. In gardens sufficient attention may be paid to each plant, but in planting large areas, the coolies cannot be superintended in planting each plant; one young plant may have the earth torn from the root or allowed to drop before planting, and it may never overtake its neighbours.

No care could make up for deficiency in soil: that will show itself very rapidly. Aspect and elevation, too, tells very remarkably on cinchona.

16. Do you consider cold soil exceptional, or is it general over the plantation?—It is not general, but it is more common in Rishap than in Rungbee.

29.* Is there more than one form of disease among the cinchona plants?—No; only one. I never observed the disease to spread circularly round the stem.

39. Supposing that you were to take a plant indigenous to the soil and propogate it by seedlings and cuttings, and plant it six by six over the Rungbee valley, would you expect it to be more uniform than *c. succirubra?*—No, or very slightly so; but some plants have a very wide range in nature,—are universal plants.

In taking cuttings, would you willingly propagate from a diseased stock plant?—If I could get a good cutting from an unsound plant, I imagine it might produce a sound tree; but I should decidedly select my cuttings from the soundest plants.

You planted out, we understand, with your own hands the plants that were planted out in 1864; how many were then planted out?—It may be seen exactly in the records.

Do you recollect the state of those plants when planted?—Ten per cent. perhaps were old, exhausted stock plants from the Neilgherries, 90 per cent. were healthy cuttings of our own propagation.

Did many of those plants die in the first two years?—Not very many, I think; but I believe it is not improbable that the whole of the exhausted plants died.

When I last visited the Sikkim Plantation in 1868, it was my opinion, as was then Dr. J. Anderson's, that the condition of the plantations had generally improved. I am positive that the percentage of diseased plants had greatly diminished. We had then got very much stronger stock plants.

I do not at all believe that the disease is caused by external conditions.

APPENDIX B.

Statement of Expenditure in collecting, carrying, and manufacturing one thousand pounds of Succirubra Twig Bark (wet).

	Rs.	As.	P.
40 women collecting bark, at 3 annas 1 pie per working day ...	7	11	4
Carriage of bark, at 4 annas per maund	3	2	0
Coolie labor for boiling, pressing, precipitating, and filtering ...	3	8	0
Lime	0	12	0
Drying and grinding precipitate	0	8	8
Working cone, and charcoal for ditto	1	4	0
Recovering alcohol	0	8	0
Loss of alcohol	1	4	0
Filters, gum, bladder, &c., and drying and pounding the alkaloids ...	0	12	0
Total ...	19	6	0

To the above amount required to be added cost of 7½lbs. sulphuric acid, 2lb. hydrochloric acid, interest on cost of machinery, and European superintendence.

Average yield of alkaloids from 1,000lbs. of wet bark ... 15oz.

RUNGBEE;
The 6th March 1871.

J. GAMMIE.

APPENDIX C.

Report of some numerical results obtained from examination of the condition of the "C. Succirubra" plantations by MR. C. B. CLARKE, *in March* 1871, *under instructions of* DR. CAMPBELL BROWN, *President of the Cinchona Commission.*

THE following numeral results were obtained by following a single line of plants across the plantation, examining every tree. Patches of 1864 and 1866 planting were examined for reasons given in the notes; and in 1867 plantation, two lines were taken in order to get a larger number of plants within the breadth of the plantation.

2. This examination confirmed my opinion that the tabulation of results of no practicable number of trees would furnish sound grounds for generalization concerning the whole,—though the figures are for other purposes by no means without value. I selected good pieces of plantation in running the lines through the 1870 planting and line B through 1868 planting, but the other lines pass mostly through inferior parts of the plantation. Very different numerical results would have followed a different choice of lines for examination.

3. The trees are planted, where the ground permits, six feet by six; holes at these distances, called *tullies*, are prepared. If the ground, from stoniness or wetness, is exceedingly unfavorable, no *tullies* are prepared in this part of the line: and where a *tully* has been prepared, no plant is put if a large stone is found close to the surface of the soil, or the *tully* otherwise appears very unpromising. After the first year the vacancies in the lines are filled up. No further filling up is done, because it is assumed, if two plants die out in the same *tully*, that it is probably not a favorable one, and at six feet apart a moderate percentage of vacancies does no harm.

Hence it is impossible to estimate, except by guess, the percentage of vacancies in the existing plantation. Where a vacancy in bad ground occurs in the line, we can often not ascertain how many *tullies* were originally dug; and where sufficient marks remain to assure us about this, we are not certain how many ever had trees planted in them.

4. The fourth column shows the percentage of trees standing now sound, *i. e.*, which do not show any rotten places in the bark, however small.

In this column are included trees which have lost their leaders. Such trees may have lost their leaders by circular bark disease, hail, borers, wind, or various accidents; but if the tree showed no unhealthy bark, I could not generally venture to guess what might have been the cause of the loss of the leader.

In this column also are included very many trees exhibiting long scars where the bark has been affected and longitudinal strips of it have died; but where the bark on the edges of such marks is now quite sound, and the whole plant vigorous, and, in our opinion, likely to make a good tree, I was in great difficulty how to tabulate these cases, which are very numerous in the older plantations.

5. The Rungbee valley is a gigantic stony landslip. The surface is covered in places with a very irregular thickness of vegetable earth; it may vary from six inches to several feet in thickness within a short distance. The soil below this is gritty and poor, filled with stones of every size, but in no place that I examined did I find clay below the vegetable earth. The *cinchona succirubra* trees exhibit the best growth where the vegetable soil is deepest; they become stunted and may never make trees where there is no vegetable soil at all: they die out where there occurs stagnant water at their roots. These very simple remarks are all that I can offer regarding the

effect of soil, concerning which I received particular instructions to make observation.

Year of planting.	Tullies examined.	Trees standing.	Percentage of trees standing now sound.	Average height of trees standing.	Approximate elevation of the trees above the sea in feet.
				Ft. In.	
1864 ...	156	68	67	13 0	2,500
1865 ...	None planted.				
1866 ...	144	118	81	12 0	2,500
1867 ...	499	437	76	8 0	2,200—1,500
1868(*a*) ...	327	273	71	3 6	3,000—2,400
1868(*b*) ...	133	112	83	6 4	2,300—1,900
1869 ...	287	230	85	2 8	2,800—2,300
1870 ...	100	90	97	3 0	2,400

Note on the figures above for 1864.

In 1864 only one patch of 380 plants was planted out. No line of any length could be run through it, and the northern portion was selected for examination.

Of the 156 *tullies* examined, 53 contained the living stools of trees lately cut in the process of thinning. The ground remains well covered.

Of the 68 standing trees, 57 show distinct signs that they have at some period or other of their lives suffered from bark disease, and the other 11 have been nearly all cut down, at least once, which leads me to a strong suspicion that they have also been unhealthy at some time. These 1864 trees might be statistically returned 100 per cent. diseased if our theory of "canker" be adopted, but their produce in bark has been satisfactory, and many of them are now very fine trees: in my opinion, likely to stand. It does not appear that any tree has ever died of bark disease, but several have been broken across at various heights from the ground by circular bark disease, and others would never make fine trees unless cut near the ground, and they shall then throw a healthy shoot. The soil on which this patch stands is exceptionally good, as is also the drainage.

Note on the figures above for 1866.

In selecting the trees of 1866 for examination, there were four very different pieces of plantation to choose from, *viz.*,—(1) the Teesta plantation; (2) the Rishap corner; (3) Kennedy's ridge; and (4) the Rungbee patch.

Of these the last was selected because—(1) the Teesta plantation was known to be remarkably clean stemmed; (2) the Rishap corner has been judged by Mr. McIvor to be the finest Rungbee plantation; (3) Kennedy's ridge was planted late in 1866, and so many of the plants died, that it was largely re-planted in 1867; moreover, it has been lately very heavily thinned.

In this case (as in the 1864 planting) no long line could be taken, and a patch was examined; it chanced that the piece selected comprised a corner of old bamboo jungle which was exceptionally good.

Of the 144 *tullies* examined, 17 contained the living stools of trees cut in December 1870 for bark in the course of thinning; the trees thinned out were doubtless the worst.

Of the 118 trees now standing, 44 at least have at some time or other suffered from bark disease; of these, 22 are reckoned above as "now sound."

Many of the trees (as also of the 1864 trees examined) have been heavily barked, *i. e.*, strips three feet long have been taken off for half the circumference of the stem. The bark appears invariably to have grown again; but we must suppose the growth of the trees to have been checked by this process.

Note on the figures above for 1867.

The strongest portions of the 1867 planting have been thinned; the lines examined were selected so as to pass through parts (autumn planted) of 1867 plantation, which have not been thinned.

The soil here is in turn swamp, rock, and slopes covered with good vegetable mould, giving the plantations the patchy aspect which characterizes lower Rishap. The upper 100 and lower 100 trees in these lines would have given totally different results; the upper 100 would show but 60 per cent. with stems now sound, the lower 100 would show 83 per cent. with clean stems.

In this respect, however, this one line gives correctly the character of the whole plantation in lower Rishap, as I know from other observations.

Note on the figures above for 1868.

The line (A) selected for examination commenced at the point near Spicer's Hut, where Mr. McIvor pointed out his views to the cinchona commission. It no doubt passes through the worst portion of the 1868 plantation, and indeed through the least successful part of the whole Rungbee plantations.

On running this line across the whole breadth of the 1868 planting from this point, the frequency of occurrence of diseased bark does not appear very high, but the number of stunted shrubby plants is very great; the average height of the upper 167 plants being but 2 feet 10 inches. These trees were, as I understand, planted carefully and well, but the ground here is almost entirely wanting in a cover of vegetable soil.

The line (B) was selected (for contrast) in the good portion of the 1868 plantation. Of the trees marked as not having clean stems, only a very small percentage were, in my opinion, affected with any unhealthiness likely to prove serious.

The percentage of clean stemmed trees in (A) and (B) does not appear very different, and gives no idea of the really different character of the planting, which, however, is faithfully represented by the average heights of the trees.

Note on the figures above for 1869.

The line selected passes through the whole breadth of the 1869 planting, and the upper end of the line passes through some of the least successful plantation.

As in the case of line (A) in the 1868 planting, the recorded percentage of clean stems does not distinctly bring out the state of the plantation, but the difference in height shows distinctly enough how inferior the growth at the higher level is to that at the lower.

Note on the figures above for 1870.

I selected here a good part of the plantation for examination.

The vacancies recorded occur chiefly in a swamp where the trees in all the adjacent lines are dead.

These fine young trees were raised by cuttings from old stock plants.

I regret the length to which these notes extend, but I fear that, even with this copiousness of remark, the statistics given may be misleading, giving in some respects too good, in others too bad, an impression if generalized from.

C. B. CLARKE.

APPENDIX E.

As the committee is unable to arrive at a unanimous decision as to the process best adapted for the extraction of the alkaloids in a tolerably pure state, Mr. Broughton's opinions on the subject differing so essentially from mine, I am obliged to submit my views to Government in a distinct report.

In order to place the matter before them in as clear a light as possible, and to render a comparison of the two processes more easy, I will first briefly describe that adopted by Mr. Broughton in all its stages, and afterwards that which I am led to think will be most suitable under present circumstances. Mr. Broughton's process includes the following operations, numbered in the order in which I have put them down:

I. The fresh bark is boiled for several hours in a copper boiler with water containing a certain amount of sulphuric acid; the bark is then squeezed in a powerful press, and the operation repeated two or three times with fresh water and acid.

II. The acid decoction, containing the cinchona alkaloids in solution, mixed up with a number of impurities extracted by boiling, is allowed to cool.

III. Milk of lime is added in excess to the liquid. This causes the precipitation of the alkaloids together with a quantity of impurities extracted from the bark by boiling.

IV. After some time this precipitate is thrown into bags and allowed to drain.

V. The precipitate is dried.

VI. The precipitate is reduced to a coarse powder between ordinary grindstones.

VII. The precipitate is now put into a copper vessel, which is fitted to another of the same metal containing alcohol acidified with sulphuric acid. This alcohol is then heated, and by an ingenious contrivance the hot vapour of it is made to permeate the precipitate over and over again until the latter is supposed to be exhausted of all its alkaloid. This operation takes a considerable time, at least forty-eight hours being required for the exhaustion of 50lb. precipitate.

VIII. The copper retort containing the alkaloids dissolved in the acidified alcohol is connected with the worm of a still and the alcohol recovered, leaving behind in the retort the alkaloid, of the consistence and colour of treacle or tar, owing to the admixture of a considerable quantity of coloring matter and resin, &c., &c., which was washed out of the precipitate along with the alkaloids by the alcohol in operation VII.

IX. This dark acid mass is now thrown into a bucket of cold water, the effect being to precipitate a quantity of impurities (very variable), and to leave the alkaloids and the remainder of the impurities dissolved in the water.

X. The precipitated impurities having been removed, caustic soda or potash is now added to this acid solution of the alkaloids, so as nearly to neutralize all the free acid. (This requires some dexterity: if carried too far, there will be a considerable loss of alkaloid; if not far enough, the preparation will ultimately have a bad colour.) The object of this is to precipitate a further quantity of colouring matter, &c., whilst the bulk of the alkaloids remains in solution.

XI. Filter the above, and to the filtrate add soda or potash in excess, which will precipitate the alkaloids.

XII. Allow the precipitate to drain in bags.

XIII. Dry the precipitate, which is Mr. Broughton's so-called *amorphous quinine.*—*Vide* sample A.

N. B.—In addition to all these details, a considerable amount of alcohol adheres to the exhaused precipitate. This has to be washed out with water and recovered by distillation.

Dr. Simpson's Process.

I SHOULD premise, before entering on its details, that it was suggested to me by Professor DeVrij, whilst I was studying the chemistry of the cinchona barks in his laboratory, as a process likely to prove very suitable for the extraction of the alkaloids from the fresh bark at Darjeeling. I have named it my process merely in contradistinction to that of Mr. Broughton. The principles are novel in neither, whilst some of the practical details are so in both.

I advocate it in preference to Mr. Broughton's process, because I think it much simpler in its details, and because it produces a safer product. I judge from Mr. Clarke's working of the process, as I have not seen any specimen of that prepared in Madras.

I. Infuse* the bark in cold dilute acid for at least twenty-four hours: squeeze in a powerful press, and repeat the operation three times.

* Mr. Broughton has called my attention to the fact that I have omitted to state that the bark must be crushed.

II. To the acid infusion which contains the alkaloids and some impurities (but infinitely less of the latter than extracted by boiling) add potash or soda in such quantity as nearly to neutralize the acid; this has the effect of throwing down a quantity of colouring matter and other impurities, the bulk of the alkaloids remaining in solution.

III. Filter the above, and to the clear filtered solution add soda or potash in excess, and the alkaloids are precipitated.

IV. Dry the precipitate, which is the *cinchona alkaloids* by Dr. Simpson's process.—*Vide* sample B.

A casual glance at the above would naturally lead any one (even a chemist unacquainted with the cinchona alkaloids) to the conclusion that the last described process is infinitely the better of the two, always supposing the products to be equal in value.

I should be sorry, however, that any such conclusion should be hastily formed. Mr. Broughton has had great experience in working with fresh bark, and I have had, speaking comparatively, none. He assures me that he has tried my process, though, he admits, not with all the conditions fulfilled, and that he has settled on his own as the most suitable one.

The only real objection that can be raised to this process is *loss of alkaloid* or a greater amount of acid (and consequently more alkali) required to extract by cold infusion the same amount of alkaloid that can be obtained by *boiling* with a lesser quantity. I am of opinion, however, from some experiments I have made bearing on this very point, that both loss of alkaloid and any great additional expenditure of acid may be obviated in practise by using certain precautions in the details of the process. At the same time I wish it to be clearly understood that I do not uphold this process to the exclusion of Mr. Broughton's or any other; but on account of its great comparative simplicity, and the fact that the apparatus necessary to carry it out, even on a large scale, can be purchased on the spot at a nominal cost, I strongly recommend the Government to give it a fair trial in competent hands.

The questions to be determined by the experiment would be—

1*st* whether the process yielded less akaloid than is obtained by Mr. Broughton's from a similar sample of bark.

2*nd* if less, how much less; and whether or not the loss in alkaloid is not more than compensated for by the cheapness of process and requisite machinery. If after a sufficient trial the loss should still prove serious, I should

either modify or abandon the process; if not, I think there can be no doubt as to its being the better one of the two.

There are, in my opinion, defects of a much more serious nature in the process advocated by Mr. Broughton,—one of them at least being of a grave nature. First of all, there is the chance of an explosion; the process as performed at Rungbee being left a good deal in the hands of Native coolies, and the retorts containing the alcohol being treated with naked fire.

Next, there is the constant liability of Government being cheated in the matter of alcohol, a beverage of which hill coolies are particularly fond; and last, though not by any means least, is the danger of the product being contaminated with copper if the operation be not conducted with care and skill. Indeed, I can hardly conceive its not being so contaminated during some stage of the process, and to remove this, contamination must, therefore, be considered as another stage or operation in Mr. Broughton's process.

This gentleman's chief objection to the cold infusion is the alleged loss of alkaloid, which, he says, is practically *nil* in his process.

Considering the nature of the substance which he has to exhaust with alcohol, *viz.*, a quantity of alkaloid wrapped up, so to speak, in a mass of sulphate of lime, which latter is *insoluble* in spirit, I have from the first doubted whether he *did* recover all the alkaloids; and in order to test the truth of my theory on the subject, I powdered *very minutely*, and subjected to prolonged boiling in alcohol, a small quantity of the precipitate which was thrown away as exhausted at Rungbee, and I think I shall be able shortly to show the Government that I was correct in my supposition. Here again, however, I must call attention to the fact that I got this precipitate at Rungbee, and it does not at all follow that I should succeed in obtaining similar results in Madras, where the operations are conducted under Mr. Broughton's own superintendence. The test laid down by him to show when the precipitate becomes exhausted was duly applied in this particular case before it was thrown away.

APPENDIX F.

Memorandum.

DR. SIMPSON having been good enough to allow me to read his attached report, I take this opportunity of mentioning a few facts connected with its subject.

2. My process was adopted after a thorough consideration of the whole subject, which includes Indian barks and indigenous manufacturing materials among its items. I have fully tried the process of infusion now recommended by Dr. Simpson, employing altogether about 2,000lb of red bark in the experiments. The conditions were nearly those laid down by Dr. Simpson, the only failure being that the bark was not *crushed* beforehand, but simply cut small. I found by suitable analysis that but two-thirds of the whole amount of alkaloid contained in the bark was extracted, and that the amount of acid that was requisite, even with the greatest economy, was more the four times as much as that necessary when boiling was applied. This acid being the only manufacturing material brought from Europe, it is exceedingly necessary that it should be employed with the greatest economy.

3. Furthermore, according to Dr. Simpson's verbal statements (*vide* proceedings of commission), it is quite necessary that before the bark be subjected to his process that it should be *crushed* by machinery. Indeed, if the bark were submitted whole to the acid water, scarcely any alkaloid would be extracted. It is this necessity which detracts greatly from the simplicity of the process; nor am I aware of any existing machine which will effectively perform this necessary work. The difficulty of cutting bark small is great; but the thorough

The plants to be examined half-yearly or yearly, as may be thought desirable, and the result entered in the form given below. In the first set of tables drawn up, a number of the columns would necessarily be vacant. There should be a separate table for each hundred plants of each year's planting: A for those of one part, B for those of another, and the same for each species—*Succirubra* and *Calisaya*, the only two now to be grown. Plantings of future years to be similarly dealt with.

Further propagation by "cuttings" or "seed" to be kept an exact account of.

Depth of sub-soil to be taken in two or three different places on the ground covered by each hundred plants.

Under the plan suggested, there having been no planting in 1865, the plants of *Succirubra* to be taken account of would be 1,200, and of *Calisaya* planted in 1868-69-70 would be 600; in all, 1,800. This seems a small number, perhaps, to represent the plantation, but it is thought it would be better to gather exact and carefully drawn up information regarding a few, than an account of a large number which might be less likely to be accurate. In going over the ground for the few, there would be an opportunity of gaining a good idea of the whole.

APPENDIX G.

Schedule to be used in the Periodical Cinchona Reports.

TABLE A OF THE YEAR 1864.

Cinchona Succirubra, date

Number of plants.	Number diseased.	Number doubtful.	CASUALTIES.		Height of each plant.	Increase.	Greatest growth.	Least growth.	Average growth.	REMAINING.			Depth of sub-soil from surface.	GENERAL REMARKS.
			Death.	Otherwise.						Healthy.	Diseased.	Doubtful.		
100														

APPENDIX H

Being a memorandum of MR. C. B. CLARKE *on Appendix G.*

1. I DIFFER from the other members of the Commission merely on the details of the schedule in Appendix G which it is proposed to introduce.

The filling up that schedule involves, besides a record of well ascertainable facts, the numerical tabulation of several matters of opinion, concerning which no two gardeners now on the plantations agree; and it is, therefore, reported (in paragraph 12 of the report) that it is undesirable that the filling up of the schedule proposed in Appendix G should be entrusted to gardeners.

I believe, on the other hand, that the information really required may be safely obtained from the resident gardeners by adopting for the form of schedule an extension of the tables now in use.

I append a copy of the half-yearly report for 31st September 1870, in which the measurements of 75 trees are shown by tabular statement.

2. I should hardly have thought it necessary, on a point of detail, to have drawn up a minute in opposition to the other members of the Commission; but the carrying out of these measurements will devolve on the Superintendent of the Plantations, and I feel that I cannot recommend a plan to Government in carrying out which I see so much difficulty. To examine as detailedly as proposed 1,800 trees, scattered on a wide plantation, will be a work of time: it will be a considerable journey from the inspection bungalow to each row of trees to be examined. Practically, it will not be found worthwhile to attempt to proceed with the work during wet hours. What is really necessitated by the report (paragraph 12) is, that Government should depute an officer to journey to Rungbee, at regular intervals of six months' or twelve months' stay there, and carry out these measurements, all which I believe unnecessary for attaining the proposed object.

Under the scheme in Appendix G, 1,800 trees require to be examined. I estimate that in two years' time 3,000 trees would require to be tabulated, as there will probably be a third species of cinchona cultivated.

3. Turning to the details of the schedule in Appendix G, there will be a difficulty in determining the "number of plants" for the reasons shewn in my minute in Appendix C.

There will be a difficulty in returning the "number diseased," as no two gardeners coincide about disease, and no definition of disease is suggested. This difficulty is meant to be provided against by the next heading of "doubtful;" but the numbers obtained under this system of classification at six monthly intervals will be, in my opinion, of little value.

The cause of deaths is required to be ascertained in the next column. I expect the results obtained here will be of small value.

The tabulation of the plants left standing as healthy, diseased, doubtful, I do not expect to furnish valuable results; different men will estimate differently the plants. I do not say in any of these cases that an expression of opinion may not be valuable. I do not consider these points of opinion likely to be well represented by numerical tables.

On comparing Appendix C, my grounds for supposing it of no use to tabulate at two or three places the thickness of the vegetable soil, will be at once inferred.

4. Speaking generally, I should be exceedingly sorry to attempt to fill up the Schedule G for 100 plants on the plantation. I could not do it in a way that would be satisfactory to myself.

5. I suggest that a schedule of the annexed simple form be used:

	Date of plating out.	Height on 1st April 1871.	Height on 1st October 1871.	Increase.	Decrease.	Remark on the condition of each plant.
		Ft. in.	Ft. in.	Inches.	Inches.	
1	1st March 1868	8 10	10 10	24	.....	Sound.
2	... ...	8 0	4 0	.....	48	Leader gone.
3	... ...	3 0	3 8	2	.....	Is over a large stone.
4	... ...	6 4	... ...	.....	76	Dead.
5	... ...	7 6	11 3	45	.....	Now sound.
6	... ...	5 6	6 0	6	.....	Sickly; in a swamp.
7	... ...	7 6	1 6	.....	72	Cut down for unhealthiness, and has thrown a shoot.
8	6th March 1868	6 4	10 0	44	.....	Sound.
9	... ...	9 6	2 0	.....	90	Cut in the course of thinning, and has thrown a shoot.
10	... ...	5 6	7 3	21	.....	Sound.
11	... ...	and so forth.				
12	... ...					

6. The rows selected for record will have a numbered stick at the base of each tree. When these have once been placed, it will, from the irregularity of the plantation, be utterly impossible to shift them to any other line.

All the facts required can then be left to the gardeners, for (as now) the Superintendent without visiting the plantation at any particular month can test in a morning the whole six monthly record sufficiently.

7. The facts being thus ascertained, they should (as now) be printed *in extenso;* and it will be the duty of the Superintendent to make such deductions and generalizations from them in his report as he thinks warranted. The average growth in height will be a most valuable deduction while the trees are small; but when the trees get any size, it is difficult to make. If the trees are thinned, the worst are cut down; so that by giving the average of the remainder an enormous growth appears: if the trees are not thinned, they are not given a fair chance of growth. [This difficulty applies now to the present measurement of *C. Calisaya.*]

8. The casualties that affect the trees are so varied, that I think a remark column is the only way of representing them.

So in the case of affections of the bark, which in some forms are very fatal to the whole of the branch above the affected part, it is a matter of opinion whether one of the more serious forms is a variety, or even a necessary consequence of another comparatively harmless form. But I do not think it is advisable to frame a schedule which shall introduce the tabulation of such matters, or with the object of refuting a particular theory regarding them. Provided a tree grows regularly several feet a year, I do not regard much such speculations; the tree will produce a satisfactory amount of bark, and, as a general rule, I do not fear trees dying which have been as yet growing well: if they meditate dying extensively, I expect them to stop growing first. The most serious forms of disease are those which cost a tree its leader, and the tabulation of heights only at once represents this sufficiently.

I therefore consider that after all tables showing growth contain essentially the information wanted, and without admixture of controvertible matter.

9. I quite agree in the concluding remarks of Dr. J. Campbell Brown's minute. I go further and question whether the record of a much smaller number of trees will not be as valuable as that of 1,800, which latter number affords poor ground for generalizing concerning 1,200,000 trees.

I think one row of 50 trees recorded in each year's plantation would answer the required purpose. It must be recollected that the preparation of these

statistics costs Government money; that lists of 50 for six years' plantation of *C. Succirubra* and three years' plantation of *C. Calisaya*, will occupy nine pages of printing, and that this number will rapdly increase. This will be exclusive of deductions, and may, I fear, be cumbrous. Indeed, in my original scheme, I proposed to examine lines of 25 only in each year's planting, but I substituted lines of 50 in trying to meet the views of the other members of the Commission.

10. The present Appendix H has been drawn up in extreme haste, in order not to delay the submission of the report.

REPORT ON THE CULTIVATION OF CINCHONA AT DARJEELING FOR THE HALF-YEAR ENDING 30TH SEPTEMBER 1870.

From C. B. CLARKE, ESQ., M.A., Officiating Superintendent, Botanic Garden, and in charge of Cinchona Cultivation in Bengal, to the Officiating Secretary to the Government of Bengal, General Department,—No. 226, dated Rungbee, Darjeeling, the 25th October 1870.

THE Government of Bengal having approved of the substitution of half-yearly for monthly reports of the cinchona plantations near Darjeeling, I beg leave to submit herewith the report for the six months ending 30th September 1870, which is intended to follow the report for the month of March 1870.

Report on the Cultivation of Cinchona at Darjeeling for the half-year ending 30th September 1870.

THE season has been unusually wet, the rain-fall having already (25th October) amounted at the inspection bungalow to 200 inches, whereas the total fall for the year averages 180 inches only. The health of the plantations of *C. Succirubra* and *C. Calisaya* has remained good, and their growth satisfactory, though somewhat less than that of the preceding year. But *C. Officinalis* has suffered more than during previous rainy seasons, and all hope must be abandoned that this species can be grown to an economic profit at Rungbee.

Taking the plantation called the 5th in the tabular report, which represents best the present centre of the plantations, it will appear that the average growth of the measured plants of *C. Calisaya* for the half-year has been 36 inches, and that of *C. Succirubra* 22 inches. The latter, from accidental circumstances in choice of the plants measured, is too low, and does not represent fairly the growth of plants of that age in that part of the plantation. The best plants of *C. Succirubra* and *C. Calisaya* have, within three years of planting out, surpassed 20 feet in height. No measurement is given of *C. Officinalis*. It may be said generally of the older plants, that some 40 per cent. perished during the last six months, and that those which survived did not grow. The number of plants of *C. Officinalis* has been by estimation reduced from 930,704 on 31st March 1870 to 440,000 on 30th September 1870; but it would be best, in any calculations regarding these plantations, to write off these 440,000 at once; for, though some of them may survive for years, there is no probability that any profitable result will ever be derived from them.

Throughout the *C. Officinalis* plantation below 4,500 feet level, *C. Succirubra* was planted in 1869, in order to utilize area kept clean at considerable expense. These young *C. Succirubra* promise exceedingly well.

The 164,615 plants of *C. Succirubra* planted out during the early part of the six months under report were required to fill up the 1,000 acres of that species as designed by Dr. T. Anderson. The 33,101 plants of *C. Officinalis* were put out at a higher level (5,000 feet) than before as an experiment

By far the greater portion of the coolie-labor is spent in scouring the young plantations during the rains. In order to ensure a sufficient supply of labor at this period, it is necessary (as in the surrounding tea plantations) to maintain the coolies during the year, so that, during the cold weather, it has been difficult to devise sufficient employment for them. The cold weather is the best time for planting out; and in accordance with Dr. T. Anderson's advice, it is proposed, during the ensuing cold season, to employ them in planting out *c. succirubra* in a rough way, on some portions of the reserve which are at too high a level for *c. calisaya* to thrive upon; and it is for this purpose that a considerable quantity of *c. succirubra* seed has been raised, put down at 500,000 (including some stock raised by cuttings) in the accompanying tabular statement.

C. Calisaya has set its seed very favorably during the last two months. This seed should ripen in the course of next spring; and it is hoped that in future the quantity of seed produced will be sufficient to enable the extension of *c. calisaya* in any quantity that may be thought desirable.

The usual tabular statements are appended.

Table shewing the Temperature at the different Plantations for the half-year ending 30th September 1870.

Plantations.		Mean maximum.	Mean minimum.	Mean temperature.	Remarks.
April 1870 ...	2nd plantation ..	.....	54·40	.....	
	4th ditto ...	.....	53·92	.. ...	
	Rishap ditto ...	84·80	61·30	73·05	
May ,, ...	2nd plantation ...	.....	60·17	.....	
	4th ditto ...	.....	62·92	.....	
	Rishap ditto ...	88·67	68·19	78·43	
June ,, ...	2nd plantation ...	.....	61·78	.....	
	4th ditto ...	...	66·17	.....	
	Rishap ditto ...	84·16	69·80	76 98	
July ,, ...	2nd plantation ...	.....	64 00	.....	
	4th ditto ...	.....	67·48	.....	
	Rishap ditto ...	81·37	70·68	76·03	
Aug. ,, ...	2nd plantation ...	72·90	63·00	67·95	
	4th ditto ...	79·60	67·40	73·50	
	Rishap ditto ...	84·30	70·40	77·35	
Sept. ,, ...	2nd plantation ...	71·80	60·80	66·30	
	4th ditto ...	80·28	65·53	72·95	
	Rishap ditto ...	83·40	69·00	76·20	

Table shewing the Maximum and Minimum Growth for the half-year ending 30th September 1870.

Names of Species.	Teesta.		Rishap.	Rungbee.	
	First plantation.	Second plantation.	Third. plantation.	Fourth plantation.	Fifth. plantation.
C. succirubra ...	Not measured	Not measured	5 to 33 inches	21 to 32 inches	9 to 40 inches.
C. micrantha ...	Ditto ..	Ditto ...	18 to 28 ,,	28 to 37 ,,	24 to 44 ,,
C. calisaya ...	Ditto ...	Ditto ...	16 to 44 ,,	16 to 23 ,,	28 to 48 ,,

Table shewing the Number and Distribution of Cinchona Plants in the Government Plantations at Darjeeling on the 1st October 1870.

Names of species of Cinchona.	Number in permanent plantations.	Number of stock plants for propagation.	Number of seedlings or rooted cuttings in nursery beds for permanent plantations.	Number of rooted plants in cutting beds.	Number of cuttings made during the month.	Total number of plants, cuttings, and seedlings.
C. succirubra	1,219,715	20,000	120,000	260,000	120,000	1,739,715
C. calisaya	24,860	10,000	34,500	23,000	8,000	100,360
C. micrantha	29,667	None.	None.	None.	None.	29,667
C. officinalis and varieties ...	440,000	...	...	...	...	440,000
C. pahudiana	5,092	...	...	...	...	5,092
Total ...	1,719,334	30,000	154,500	283,000	128,000	2,314,834

RUNGBEE,
The 3rd October 1870.

J. GAMMIE,
Head Gardener in charge,
Cinchona Plantations, Darjeeling.

Table shewing the Growth of Cinchona in the Darjeeling Plantations during the six months ending 30th September 1870.

Names.	Numbers.	1st Plantation (Teesta), Altitude 900 feet.					2nd Plantation (Teesta), Altitude 450 feet.					3rd Plantation (Rishap), Altitude 2,000 feet.					4th Plantation (Rungbee), Altitude 3,332 feet.					5th Plantation (Rungbee), Altitude 2,556 feet.				
		Date of planting, 18	Height in inches on	Height on 1st	Height on 1st	Growth during	Date of planting, 18	Height in inches on	Height on 1st	Height on 1st	Growth during	Date of planting, 1867.	Height in inches on 1st January 1868.	Height on 1st April 1870.	Height on 1st October 1870.	Growth during the 6 months.	Date of planting, 1864.	Height in inches when planted.	Height on 1st April 1870.	Height on 1st October 1870.	Growth during the 6 months.	Date of planting 1864.	Height in inches when planted.	Height on 1st April 1870.	Height on 1st October 1870.	Growth during the 6 months.
C. Succirubra	1	.....	...	...	...	...	.....	...	...	...	...	29th March	29	129	159	30	29th July	5	159	187	28	15th Oct.	6	271	280	9
Ditto	2	.....	...	...	...	...	.....	...	...	...	...	„ „	30	145	172	27	„ „	6	145	166	21	„ „	10½	175	194	19
Ditto	3	.....	...	...	...	...	.....	...	...	...	...	„ „	37	129	161	32	„ „	7½	159	189	30	29th July	5½	187	201	13
Ditto	4	.....	...	...	...	...	.....	...	...	...	...	„ „	24	146	179	33	15th Oct.	10½	156	180	24	„ „	3	192	204	12
Ditto	5	.....	...	...	...	...	.....	...	...	...	...	„ „	37	158	166	8	29th July	4¾	130	153	23	„ „	5½	196	232	36
Ditto	6	.....	...	...	...	...	.....	...	...	...	...	„ „	30	158	182	24	„ „	4½	92	112	20	„ „	3	156	190	34
Ditto	7	.....	...	...	...	...	.....	...	...	...	...	„ „	27	105	133	28	„ „	3½	168	200	32	„ „	4	226	266	40
Ditto	8	.....	...	...	...	...	.....	...	...	...	...	„ „	30	152	176	24	„ „	2	136	157	21	„ „	4½	174	198	24
Ditto	9	.....	...	...	...	...	.....	...	...	...	...	„ „	29	135	146	11	„ „	3	129	159	30	„ „	4	197	224	27
Ditto	10	.....	...	...	...	...	.....	...	...	...	...	„ „	25	114	119	5	„ „	3	153	180	27	„ „	3	184	198	14
C. Micrantha	1	.....	...	...	...	...	.....	...	...	...	...	16th „	17	129	157	28	15th Oct.	9	165	202	37	„ „	5½	105	134	29
Ditto	2	.....	...	...	...	...	.....	...	...	...	...	„ „	19	137	162	25	29th July	6½	128	162	34	„ „	6	108	132	24
Ditto	3	.....	...	...	...	...	.....	...	...	...	...	„ „	44	141	168	27	„ „	3	124	154	30	15th Oct.	6	120	164	44
Ditto	4	.....	...	...	...	...	.....	...	...	...	...	„ „	46½	149	169	20	„ „	2½	123	155	32	29th July	4½	145	170	25
Ditto	5	.....	...	...	...	...	.....	...	...	...	...	„ „	55½	157	175	18	15th Oct. 1867.	3	119	147	28	15th Oct. 1868.	5½	138	165	27
C. Calisaya	1	.....	...	...	...	...	.....	...	...	...	...	29th June	25	136	180	44	29th June	15½	81	99	18	1st Jan.	2	82	112	30
Ditto	2	.....	...	...	...	...	.....	...	...	...	...	„ „	16	137	165	28	„ „	9¾	78	101	23	„ „	3½	83	122	39
Ditto	3	.....	...	...	...	...	.....	...	...	...	...	„ „	15	136	164	28	„ „	12½	78	94	16	„ „	3½	84	118	34
Ditto	4	.....	...	...	...	...	.....	...	...	...	...	„ „	16	126	142	16	„ „	10	73	91	18	„ „	3¼	88	126	38
Ditto	5	.....	...	...	...	...	.....	...	...	...	...	„ „	22	129	146	17	„ „	11¼	85	105	20	„ „	1½	75	123	48
Ditto	6	.....	...	...	...	...	.....	...	...	...	...	„ „	24	138	162	24	„ „	10½	92	114	22	„ „	4¼	91	123	32
Ditto	7	.....	...	...	...	...	.....	...	...	...	...	„ „	23	138	169	31	„ „	10½	82	101	19	„ „	4	89	118	29
Ditto	8	.....	...	...	...	...	.....	...	...	...	...	„ „	19	130	159	29	„ „	15½	91	114	23	„ „	2½	105	133	28
Ditto	9	.....	...	...	...	...	.....	...	...	...	...	„ „	21	129	156	27	„ „	14½	69	91	22	„ „	7	101	141	40
Ditto	10	.....	...	...	...	...	.....	...	...	...	...	„ „	21	138	168	30	„ „	16	94	113	19	„ „	3½	92	120	28

RUNGBEE;
The 3rd October 1870.

(Signed) C. B. CLARKE,
Supdt. Botanical Gardens,
and in charge of Cinchona Cultivation in Bengal.

From A. O. HUME, ESQ., C. B. Secretary to the Government of India, Department of Agriculture, Revenue, and Commerce, to the Secretary to the Government of Bengal,—No. 18, dated Simla, the 29th June 1871.

I AM directed to acknowledge the receipt of your letter, addressed to the Government of India in the Home Department, No. 1309, dated the 8th ultimo, submitting the report of the Commission appointed to enquire into the cultivation of cinchona in British Sikkim and divers questions connected therewith.

2. I am desired, in reply, to state that the Governor General in Council entirely approves of the orders on the report already issued by the Lieutenant-Governor, and I am to request that the following remarks on the cultivation of the plant, the export of the bark to England, and the local manufacture of alkaloids, may receive His Honor's consideration.

3. As regards the first point, *viz.*, the cultivation, it seems clearly proved that *c. officinalis* is unsuited to the soil and climate of the Government Plantations in Sikkim. It has been tried at various elevations without making any progress, and its extended cultivation would be unprofitable. His Excellency in Council, therefore, agrees in the recommendation of the Commission that its further popagation should cease. All the plants now standing should be cleared away, with the exception of those which it may be desired to retain for the supply of seeds, or for other sufficient reason. It seems advisable that vigorous efforts should be made to propagate *c. calisaya* and *c. pitayensis*, which species yield a larger quantity of crystallisable alkaloid than *c. succirubra*, and which have a greater marketable value in Europe. The officers in charge of the gardens should also be directed to exert themselves to obtain for trial any other species or varieties, the yield of which in alkaloids appears likely to be superior to that of *c. succirubra*. At the same time it is not intended that the further cultivation of this latter species should be interrupted. On the contrary, all healthy seedlings and cuttings now in stock should be planted out, and further supplies of plants should still continue to be raised from seed taken from sound and healthy trees. In connection with the subject of this paragraph, I am to invite the attention of the Lieutenant-Governor to paragraph 4 of the despatch* from the Secretary of State, copy of which is forwarded herewith.

* No. 28, dated 4th April 1871.

4. His Excellency in Council is not disposed without further experiment and more careful enquiry to concur in the opinion expressed by Mr. McIvor regarding the destructive nature of the disease which has attacked some of the plants at Rungbee—a disease which is shown to have existed in the plants originally sent up from the Neilgherries as stock for the Sikkim Plantations. Disease doubtless exists, and, unless care is taken, the results may prove serious; but there appears to be no valid reason for apprehending anything like the general failure predicted by Mr. McIvor; nay more, the Governor General in Council hopes to hear that in the new plantations stocked from healthy *seedling* plants, the disease will occur more rarely, and there is reason to expect that even in the older plantations it is gradually disappearing; and that the opinion of the Commission, that the vast majority of the plants are likely to last at least seven or eight years, will prove to be well within the facts. In order, however, that one test may be applied to the different opinions expressed on this point—a test which will be peculiarly valuable as being founded on that portion of the plantation where the disease is likely to be most extensive and persistent—His Excellency in Council would be glad if His Honor the Lieutenant-Governor would be good enough to issue orders that, of the 140 trees which still remain untouched from among those planted out in 1864, none may be cut unless it should be found absolutely necessary to thin them; and that a half-yearly report may be submitted showing the progress and condition of these trees, whether disease is increasing among them or not, and any other particulars of interest regarding them.

5. The Governor General in Council concurs in the Lieutenant-Governor's decision regarding the export of bark. For some years to come the only possible method of keeping a check on expenditure, and of ascertaining the real commercial value of this experiment, will be to export annually a considerable proportion of the best bark produced, and sell it for the highest price it will fetch in the open market. I am to request further that His Honor will favor the Government of India with the earliest intimation of the financial results of the exportation now authorized in a statement exhibiting the estimated cost of production, the actual cost of picking, drying, and packing the bark, the cost of transport to Calcutta, freight, shipping, and landing charges, brokerage, and other charges in England, and *per contrá*, the price realised.

6. In regard to the remaining point, local manufacture, His Excellency in Council would be glad to be informed of the results of the enquiries being made by His Honor for a skilled and competent person to undertake the execution of systematic experiments at Rungbee.

7. The Governor General in Council is desirous that these experiments may be proceeded with energetically, and that the process advocated by Dr. Simpson, as well as that of Mr. Broughton, may receive full and fair trial, and their respective merits be accurately weighed. Mr. Broughton's process, which is already in operation at Rungbee, should receive further trial under skilled supervision, and Mr. Gammie, the Head Gardener in charge, might be directed to prepare a considerable quantity of alcohol from hill maize, in order to ascertain what it costs when made on an extensive scale. In the trial of Dr. Simpson's and Mr. Broughton's process, a quantity of, say, 2,000lbs. of fresh bark might be carefully worked up under each system, and an accurate comparison of the cost and results in each case instituted.

8. As regards the supposed discouragement of private enterprise which the Darjeeling Cinchona Association seem to believe involved in any further extensions of the Government Plantations, I am desired to remark that in this as in similar cases of the introduction of exotic staples, the first step towards enlisting the active co-operation of private capitalists generally is to prove by actual operations on a large scale that their cultivation will really be remunerative. Until this has been done, no efforts that the Government may make to establish that cultivation thoroughly can, if rightly considered, be held to affect private enterprise injuriously.

9. Considered only in the light of this broad principle generally applicable to the cases of exotic staples, it is manifest that the time has not yet come for Government to relax its exertions in the matter of cinchona cultivation. These very papers show that two of the most practised experts in chinchona are of opinion that the Sikkim Plantations are dying rapidly out, and will, in a few years, be altogether extinct. His Excellency concurs with the Commission in considering these gentlemen in error; but should their conjectures unhappily prove well-founded, the Government would probably select other sites and open out other plantations,—in a word, would persevere until cinchona cultivation was a success, and until it had secured for the fever-stricken millions of India the inestimable blessing of cheap quinine.

10. Unfortunately the field is too wide to be adequately occupied for many years to come either by Government or private individuals, or both, let both labour as they may. From the first Government has encouraged, and will always encourage, private plantations. Seeds and plants it freely gives, and throws open to inspection its own plantations, and does its utmost to make available to all the experience gained in the work by its own officers; but the Government feels that it could not, without the abnegation of a vitally important duty, leave solely to private enterprise the further prosecution of those measures necessary to secure to the people abundant and cheap supplies of the "only efficient specific for the most deadly of all Indian maladies."

11. I am finally desired to state that the Governor General in Council appreciates the satisfactory manner in which the President and Members of the Commission have discharged the important duty confided to them.

GOVERNMENT OF INDIA.

PUBLIC WORKS DEPARTMENT.

ACCOUNT AND AUDIT OFFICES OF THE OUDH AND ROHILKHUND RAILWAY.

Extract paragraphs 1 *to* 5 *and* 16 *of the Report by* CAPTAIN A. J. FILGATE, R. E., *Assistant Accountant General, Public Works Department, on the Account and Audit Offices of the Oudh and Rohilkhund Railway.*

SINCE I last inspected the Account and Audit Offices of this Railway, a complete change has been made in the manner in which the audit is conducted. Instead of having an audit carried out by a staff appointed by the Company, with an Examiner under the Consulting Engineer to check his work on behalf of Government, about the commencement of last year, with the consent of the Secretary of State and the Board of Directors, the appointment of a joint Auditor nominated by Government to carry out a combined audit of the transactions of the Railway on behalf of Government and the shareholders was sanctioned. The original idea of starting a combined audit was put forward by General Beadle shortly after his return to India as Agent of the Company; and although the proposition was not favorably received at first, after due consideration it was fully accepted by the Government of India. I am now bound to state that the joint audit appears to be a complete success in every respect, and to work with little or no friction.

2. The trial that the combined system of audit has undergone during the first year of its existence is more than sufficient to test its qualities to the fullest extent; for the work of construction during the period named has been pushed on over some 550 miles of Railway as fast as circumstances would permit, and the Auditor has been in direct account with 31 disbursing officers scattered over this length. The fact that no complaints have been received against the system is alone a fair proof of its success; but the complete manner in which the audit has been conducted to the satisfaction of the officers of Government and the Company places the matter beyond doubt.

3. The main features of the system are, that the accounts of Disbursers are submitted direct to the Auditor, who exercises a complete check over the outlay and forwards to the Company's Account Office the necessary information on which to base the entries in the books, and that no payments are made without the certificate of the Auditor as to their correctness.

4. As an example of the present state of the accounts of Disbursers, I may mention that on the 27th March, when I examined the books, out of 31 Disbursers, 27 had sent in their accounts to the Head Office up to the 17th, and the accounts of 28 officers up to the 10th idem had been examined and passed by the Auditor. It would be a good thing if some of the older Companies could be got to work up to this state of punctuality.

5. It would be superfluous on my part to enter into a full description of the manner in which the details of the accounts and audit are carried out, as the procedure has been fully described in the circulars that have from time to time been issued on the subject during the past year; but I will simply remark that the rules laid down with the sanction of the Accountant General, Public Works Department, have been adhered to. I would, however, suggest that these circulars should be published in pamphlet form for convenience of reference, advantage being taken of the opportunity for correcting any points which experience may have shewn to require modification. The system of account and audit now in force is second to none on any Railway in India, and it would be a benefit to the Companies' officials, as well as those of other undertakings, to have the rules and forms in force recorded in a lasting form.

16. In concluding these remarks, I think it my duty to bring to the notice of Government the very satisfactory manner in which Mr. Macdonald has conducted the responsible duties entrusted to him. He was the first officer of Government to whom the novel process of conducting a joint audit on behalf of the two parties to a contract has been entrusted. The situation was one of no little difficulty and great responsibility, and it is very much to Mr. Macdonald's credit that he has met and overcome the difficulties in his path and earned the approval of the Government and Railway Officials. The great success of the system however must, I think, be due in no small degree to the hearty manner in which General Beadle has co-operated with the officers of Government in its introduction.

Extract paragraph 2 *of Public Works Department Resolution No.* 409 *A. R., dated* 28*th June* 1871.

2. The Governor General in Council is much pleased to learn that the new system of joint audit on behalf of the Government and the Railway Company has been conducted in such an efficient manner and has proved so successful.

GOVERNMENT OF INDIA.

PUBLIC WORKS DEPARTMENT.

ACCOUNT AND AUDIT OFFICES OF THE OUDH AND ROHILKHUND RAILWAY.

Extract paragraphs 1 *to* 5 *and* 16 *of the Report by* CAPTAIN A. J. FILGATE, R. E., *Assistant Accountant General, Public Works Department, on the Account and Audit Offices of the Oudh and Rohilkhund Railway.*

SINCE I last inspected the Account and Audit Offices of this Railway, a complete change has been made in the manner in which the audit is conducted. Instead of having an audit carried out by a staff appointed by the Company, with an Examiner under the Consulting Engineer to check his work on behalf of Government, about the commencement of last year, with the consent of the Secretary of State and the Board of Directors, the appointment of a joint Auditor nominated by Government to carry out a combined audit of the transactions of the Railway on behalf of Government and the shareholders was sanctioned. The original idea of starting a combined audit was put forward by General Beadle shortly after his return to India as Agent of the Company; and although the proposition was not favorably received at first, after due consideration it was fully accepted by the Government of India. I am now bound to state that the joint audit appears to be a complete success in every respect, and to work with little or no friction.

2. The trial that the combined system of audit has undergone during the first year of its existence is more than sufficient to test its qualities to the fullest extent; for the work of construction during the period named has been pushed on over some 550 miles of Railway as fast as circumstances would permit, and the Auditor has been in direct account with 31 disbursing officers scattered over this length. The fact that no complaints have been received against the system is alone a fair proof of its success; but the complete manner in which the audit has been conducted to the satisfaction of the officers of Government and the Company places the matter beyond doubt.

3. The main features of the system are, that the accounts of Disbursers are submitted direct to the Auditor, who exercises a complete check over the outlay and forwards to the Company's Account Office the necessary information on which to base the entries in the books, and that no payments are made without the certificate of the Auditor as to their correctness.

4. As an example of the present state of the accounts of Disbursers, I may mention that on the 27th March, when I examined the books, out of 31 Disbursers, 27 had sent in their accounts to the Head Office up to the 17th, and the accounts of 28 officers up to the 10th idem had been examined and passed by the Auditor. It would be a good thing if some of the older Companies could be got to work up to this state of punctuality.

5. It would be superfluous on my part to enter into a full description of the manner in which the details of the accounts and audit are carried out, as the procedure has been fully described in the circulars that have from time to time been issued on the subject during the past year; but I will simply remark that the rules laid down with the sanction of the Accountant General, Public Works Department, have been adhered to. I would, however, suggest that these circulars should be published in pamphlet form for convenience of reference, advantage being taken of the opportunity for correcting any points which experience may have shewn to require modification. The system of account and audit now in force is second to none on any Railway in India, and it would be a benefit to the Companies' officials, as well as those of other undertakings, to have the rules and forms in force recorded in a lasting form.

16. In concluding these remarks, I think it my duty to bring to the notice of Government the very satisfactory manner in which Mr. Macdonald has conducted the responsible duties entrusted to him. He was the first officer of Government to whom the novel process of conducting a joint audit on behalf of the two parties to a contract has been entrusted. The situation was one of no little difficulty and great responsibility, and it is very much to Mr. Macdonald's credit that he has met and overcome the difficulties in his path and earned the approval of the Government and Railway Officials. The great success of the system however must, I think, be due in no small degree to the hearty manner in which General Beadle has co-operated with the officers of Government in its introduction.

Extract paragraph 2 *of Public Works Department Resolution No.* 409 *A. R., dated* 28*th June* 1871.

2. The Governor General in Council is much pleased to learn that the new system of joint audit on behalf of the Government and the Railway Company has been conducted in such an efficient manner and has proved so successful.

5. The Governor General in Council concurs in the Lieutenant-Governor's decision regarding the export of bark. For some years to come the only possible method of keeping a check on expenditure, and of ascertaining the real commercial value of this experiment, will be to export annually a considerable proportion of the best bark produced, and sell it for the highest price it will fetch in the open market. I am to request further that His Honor will favor the Government of India with the earliest intimation of the financial results of the exportation now authorized in a statement exhibiting the estimated cost of production, the actual cost of picking, drying, and packing the bark, the cost of transport to Calcutta, freight, shipping, and landing charges, brokerage, and other charges in England, and *per contrâ*, the price realised.

6. In regard to the remaining point, local manufacture, His Excellency in Council would be glad to be informed of the results of the enquiries being made by His Honor for a skilled and competent person to undertake the execution of systematic experiments at Rungbee.

7. The Governor General in Council is desirous that these experiments may be proceeded with energetically, and that the process advocated by Dr. Simpson, as well as that of Mr. Broughton, may receive full and fair trial, and their respective merits be accurately weighed. Mr. Broughton's process, which is already in operation at Rungbee, should receive further trial under skilled supervision, and Mr. Gammie, the Head Gardener in charge, might be directed to prepare a considerable quantity of alcohol from hill maize, in order to ascertain what it costs when made on an extensive scale. In the trial of Dr. Simpson's and Mr. Broughton's process, a quantity of, say, 2,000lbs. of fresh bark might be carefully worked up under each system, and an accurate comparison of the cost and results in each case instituted.

* * * * * * *

9. As regards the supposed discouragement of private enterprise which the Darjeeling Cinchona Association seem to believe involved in any further extensions of the Government Plantations, I am desired to remark that in this as in similar cases of the introduction of exotic staples, the first step towards enlisting the active co-operation of private capitalists generally is to prove by actual operations on a large scale that their cultivation will really be remunerative. Until this has been done, no efforts that the Government may make to establish that cultivation thoroughly can, if rightly considered, be held to affect private enterprise injuriously.

10. Considered only in the light of this broad principle generally applicable to the cases of exotic staples, it is manifest that the time has not yet come for Government to relax its exertions in the matter of cinchona cultivation. These very papers show that two of the most practised experts in chinchona are of opinion that the Sikkim Plantations are dying rapidly out, and will, in a few years, be altogether extinct. His Excellency concurs with the Commission in considering these gentlemen in error; but should their conjectures unhappily prove well-founded, the Government would probably select other sites and open out other plantations,—in a word, would persevere until cinchona cultivation was a success, and until it had secured for the fever-stricken millions of India the inestimable blessing of cheap quinine.

11. Unfortunately the field is too wide to be adequately occupied for many years to come either by Government or private individuals, or both, let both labour as they may. From the first Government has encouraged, and will always encourage, private plantations. Seeds and plants it freely gives, and throws open to inspection its own plantations, and does its utmost to make available to all the experience gained in the work by its own officers; but the Government feels that it could not, without the abnegation of a vitally important duty, leave solely to private enterprise the further prosecution of those measures necessary to secure to the people abundant and cheap supplies of the "only efficient specific for the most deadly of all Indian maladies."

* * * * * * *

14. I am finally desired to state that the Governor General in Council appreciates the satisfactory manner in which the President and Members of the Commission have discharged the important duty confided to them.

GOVERNMENT OF INDIA.

LEGISLATIVE DEPARTMENT.

Abstract of the Proceedings of the Council of the Governor General of India, assembled for the purpose of making Laws and Regulations under the provisions of the Act of Parliament 24 & 25 Vic., Cap. 67.

The Council met at Simla on Tuesday, the 27th June 1871.

PRESENT:

His Excellency the Viceroy and Governor General of India, K. P., G. M. S. I., *presiding.*

His Honour the Lieutenant-Governor of the Panjáb.

His Excellency the Commander-in-Chief, G. C. B., G. C. S. I.

The Hon'ble John Strachey.

The Hon'ble Sir Richard Temple, K. C. S. I.

The Hon'ble J. Fitzjames Stephen, Q. C.

The Hon'ble B. H. Ellis.

Major-General the Hon'ble H. W. Norman, C. B.

The Hon'ble F. R. Cockerell.

PANJÁB REGULATIONS BILL.

The Hon'ble MR. STEPHEN moved for leave to introduce a Bill for declaring what laws are in force in the Panjáb. He said that the object of the Bill was to place the law of the Panjáb on a definite footing, which at present could not be said to be the case. Before 1861, it had been supposed that the Government of India had the same right to make laws for newly conquered provinces as Her Majesty had to make laws for Crown colonies, but doubt had subsequently been thrown on this opinion. In consequence of this doubt the 25th section of the Indian Councils' Act was passed, the effect of which was to confirm every "rule, law or regulation" previously made by the Governor General or the Lieutenant-Governor. The Government had since that Act proceeded on the supposition that it negatived by implication the existence of the power in question. When the Panjáb was annexed, however, the older opinion prevailed, and the Board of Administration to which the Government of the Province was entrusted, was accordingly intrusted by a despatch from the Government of India, with very wide discretionary powers for that purpose. Under those powers, as every one knew, the province was administered with exemplary vigour and perfect success. The Board of Administration naturally issued a large number of orders for the Government of the Province, and, amongst other things, directed their Officers and were themselves directed, to conform generally to the system of administration which prevailed at the time in the North-Western Provinces. The orders made by the Board, and afterwards by Lord Lawrence, first, as Chief Commissioner and then as Lieutenant-Governor, were in some cases confirmed as they stood; in other cases they were confirmed under qualifications; in others they formed the subject of a correspondence which led to no very definite result, but which was afterwards indirectly referred to, possibly in reference to other Provinces. In other cases Lord Lawrence had occasion to refer to particular regulations in force in the North-West. These references were usually made in very general terms, as was natural and inevitable under the circumstances, and without any thought on the part of Lord Lawrence, or apparently on the part

of the Government of India, that these references amounted to legislation. This state of things went on from 1849 to 1861, when the section of the Indian Councils' Act already referred to was passed. Its authors would appear to have known vaguely that a great mass of matter of the nature already described had practically the force of law in the Panjáb, though they did not know specifically what was its nature. Such as it was, however, it was all converted into law by the enactment in question, and to this day it formed an unknown and unexplored region with which it was simply impossible for any one to acquaint himself who had not access to the archives of the Panjáb Government, and the industry and time to master their contents. It was highly undesirable to allow an undefined mass of rules and regulations, about the legal validity of which no one could be sure, to constitute a portion of the law of the province. These rules and regulations owed their existence to the necessity under which the Government of India was placed of providing forthwith for the administration of a newly-conquered province. The measures for this purpose had to be taken at once, and there was no time for simplicity and brevity. Moreover, at the time the general law of India was such, that it was natural for the Government to shrink from extending it to such a province as the Panjáb. Great as were the merits of the Regulations, they were intricate in many parts and difficult to understand. An idea as to the condition of the criminal law might be gained from a perusal of Beaufort's Digest—a work of great merit which showed the existence before the Penal Code of a more intricate and troublesome state of the Criminal Law than existed even in England. The Government did not like to burthen the official staff with so cumbrous and perplexing a system, but having no better system to give them, it was reduced to the necessity of directing in substance that the Board of Administration should introduce and act upon it as far as they found it suitable. It was usually supposed that the Panjáb had been governed, as the phrase was, patriarchally without any law at all, and at the discretion of Lord Lawrence and his colleagues. It was impossible to make a greater mistake. Lord Lawrence and his colleagues no doubt possessed great powers. It was most fortunate for the Province that they did, and that they used them with corresponding vigour, but it was by no means true that they ruled without law. On the contrary, one of their very earliest measures was to provide themselves with codes of laws which, if not so complete as the Penal Code and the Codes of Procedure, were an immense improvement on the intricate system which prevailed elsewhere in India. The book called the Panjáb Civil Code was prepared as early as 1853, and many rules relating to Civil and Criminal Procedure were introduced somewhat later. So far, indeed, was it from being true that the great authority of Lord Lawrence could be quoted in favour of personal government as against government by law, that it would be much more like the truth to say that Lord Lawrence's administration of the Panjáb afforded the clearest proof that could be given, not only of the necessity of having laws to govern by, but of the superiority of simple and scientific laws over cumbrous ones. His attempts, however, to introduce such a system met with very partial success. No doubt the laws which he introduced were, from a merely legal point of view, defective in many particulars. It would have been a miracle if this had not been the case, but the collection of rules now published showed conclusively that no man could have recognized more explicitly the necessity of introducing into the Panjáb broad, simple, definite and tangible express laws, or could have made greater efforts to obtain them. As was before observed, there was produced in 1853 the first draft of what was subsequently published as the Panjáb Civil Code. This was an attempt, and an exceedingly able attempt, at codification, and anticipated corresponding attempts that had been made in other parts of India. This volume was sanctioned as a text-book, and some portions of it relating to procedure undoubtedly acquired the force of law. But the Government of India had shrunk from the task of laying down a definite code for the Panjáb, and had continued to sanction

or discuss the special orders and suggestions made from time to time by the Local Government. The consequence was that things had gone on till they had reached their present strange condition. One instance of the strange way in which laws had come into existence was the revenue system of the province. The original letter of the Government of India to the Board of Administration had directed the four short circulars, which regulated this subject in the North-Western Provinces, to be taken as the guide on revenue operations. The language of this letter was that of an ordinary despatch; but it had all acquired the force of law. The result was this: the four letters referred to were immediately afterwards embodied in the Directions to Settlement Officers—a beautifully lucid and simple set of instructions. These Directions referred to and relied upon the Regulations, and in this way the Revenue Regulations had come into force in the Panjáb; in fact, the law was introduced by a circular professedly issued under the law. This was one instance of the extraordinary confusion that had been produced; another was the Panjáb Civil Code. When leave to publish it as law was asked, the Government of India had distinctly refused, and directed that it should be published with the authority attaching to the circulars of the Sadr Court. However, its introduction into Oudh was subsequently recommended by the Governor General, and in his recommendation he observed, in passing, that it had been found very useful in the Panjáb. This had, somewhat strangely, in MR. STEPHEN'S opinion, been regarded by the Privy Council as an admission on the part of Government that the volume had acquired the force of law in the Panjáb. The question as to how far this was the case had been much debated; and Mr. Barkley, to whose labours they were all much indebted, had, in the course of a very careful investigation, discovered a remark which appeared to be the most distinct recognition of the Panjáb Civil Code, on the part of Government that was ever made. But it laboured under the disadvantages of being equivocal, unknown to every one whom it concerned, and of being obviously made without the least intention on the part of the person who made it to legislate. The remark was as follows:—The Lieutenant-Governor in reviewing the Judicial Commissioner's Administration Report for 1858, observed—'His Honor's assent is fully given to your remarks concerning the necessity and importance of exacting a strict adherence to the letter and spirit of the Panjáb Law and Procedure.'

The Council would probably agree with him in thinking that if a law was to be considered to have come into existence because the Lieutenant-Governor in the course of official correspondence, with no idea of legislation present to his mind, made an incidental remark, which was fished up years afterwards by an industrious official, any one who managed to know what the law was, must be uncommonly fortunate.

It was now proposed that this state of things should cease. Lists of the rules and circulars confirmed by the Indian Councils' Act had been called for by his (MR. STEPHEN'S) predecessor from all parts of India concerned, and the result, so far as the Panjáb was concerned, was the present volume by Mr. Barkley, which contained all which that gentleman, after a very careful enquiry, considered to be law in the Panjáb. The question was now how to deal with it. Mr. Barkley had forwarded a memorandum which he (MR. STEPHEN) was happy to find coincided in all substantial particulars with one which had already been drawn up by himself. There would, he believed, be no difficulty in reducing the whole volume into an Act of perhaps fifty sections; and when this Act was passed, there would be an end of all non-regulation law. Two principles must, however, be kept in view in the framing of any such Act: in the first place, a large portion of the book could not be regarded as law in any sense of the word. It consisted of mere executive orders which Government was quite competent to enforce on its officials without legislation on the subject. As

to these orders, not only was it unnecessary that they should have the force of law, but it was highly inconvenient that there should be any doubt whether they had it or not, inasmuch as, if they had it, Government became bound by them and could not vary them at convenience. In the next place, there were a number of topics as to which it was highly desirable that the Local Government should have power to frame rules; such subjects were the existing track law, the slaughter of kine—a subject which, as recent experience unhappily proved, was eminently likely to provoke animosities between Mussulmans and Sikhs, and required, therefore, to be provided for by special rules. Then there were rules as to armed retainers and grazing rights. Now, if the portion of the book which consisted of alterations in the ordinary law were expressly enacted, if the portion which consisted of mere executive orders were put aside, and power were given to the Local Government to issue rules on the subjects just enumerated, he believed that the rules contained in the book might be safely repealed; and the result would be to get rid of that large mass of non-regulation law which, till now, it had been so difficult to ascertain or define. There would also have to be a section to declare what the law was according to which the Courts were to frame their decisions. It would follow the precedents set by the Bengal Regulations, and would refer to the Acts and Regulations in force in the Panjáb, to the Muhammadan and Hindú laws in the cases to which they respectively applied, and where no other law was available, to justice, equity and good conscience, which was in practice a less vague expression than it might appear to be. What would be done, accordingly, would practically amount to this: such portions of the Panjáb Civil Code as were not mere expositions of Muhammadan or Hindú law, would be re-enacted, except when it was considered unnecessary or undesirable. In some instances, the Panjáb Civil Code deviated considerably from the existing law, particularly in the case of pre-emption, the effect of custom, and insolvency. Upon the subject of the validity of the rules as to insolvency involving the administration of many lákhs of rupees, a difference of opinion existed, MR. STEPHEN understood, between the Judges of the Chief Court. As to this controversy, it appeared that the best thing to do was to leave it undecided as regarded the past, to set up everything which had been done heretofore on the assumption of the Panjáb Civil Code having the force of law, and, for the future, to lay down in clear and intelligible language what the law was which the Courts were bound to administer.

His Honour the LIEUTENANT-GOVERNOR said that he did not intend offering any commentary on the statement that his hon'ble friend had just made, but he could not but express the satisfaction which he felt that this troublesome and intricate matter was now to be dealt with. There could be no doubt that the effect of the Indian Councils' Act had been to make a great many things law that could not be regarded as law without a great deal of inconvenience alike to the Government and the people, and he sincerely rejoiced that the matter had fallen into hands so competent as to deal with it in a wise and statesmanlike manner.

The Motion was put and agreed to.

EUROPEAN VAGRANCY ACT AMENDMENT BILL.

The Hon'ble MR. STEPHEN also moved for leave to introduce a Bill to amend the European Vagrancy Act, 1869. He stated that the Government of Bengal had requested that the European Vagrancy Act should be amended with a view to meeting the case of persons coming from Australia in charge of horses, on engagements which terminated with the voyage, and immediately becoming chargeable as vagrants. In these cases it was impossible to enforce the Act, inasmuch as the persons "to serve whom" the vagrant had come to

this country, was the shipper of the horses in Australia. As this was an obvious evasion of the law, it was proposed, by the present Bill, to make the consignee in such cases liable for the expenses of the vagrant.

The Motion was put and agreed to.

The Council adjourned to Tuesday, the 4th July 1871.

H. S. CUNNINGHAM,

Offg. Secy. to the Council of the Governor General for making Laws and Regulations.

SIMLA;
The 27th June 1871.

Abstract of the Proceedings of the Council of the Governor General of India, assembled for the purpose of making Laws and Regulations under the provisions of the Act of Parliament 24 & 25 Vic., cap. 67.

The Council met at Simla on Tuesday, the 4th July 1871.

PRESENT:

His Excellency the Viceroy and Governor General of India, K. P., G. M. S. I., *presiding*.

His Honour the Lieutenant-Governor of the Panjáb.

His Excellency the Commander-in-Chief, G. C. B., G. C. S. I.

The Hon'ble John Strachey.

The Hon'ble Sir Richard Temple, K. C. S. I.

The Hon'ble J. Fitzjames Stephen, Q. C.

The Hon'ble B. H. Ellis.

Major-General the Hon'ble H. W. Norman, C. B.

The Hon'ble F. R. Cockerell.

OUDH REGULATIONS BILL.

The Hon'ble MR. COCKERELL moved for leave to introduce a Bill for declaring what laws are in force in Oudh. He said, this measure was a part of the general scheme described at the last meeting of this Council, for removing all ambiguity as to the legal effect of section twenty-five of the Indian Councils' Act of 1861, in the determination of the law in force in the non-regulation territories.

After the exhaustive remarks of his hon'ble and learned friend (Mr. Stephen) on that occasion, it was hardly necessary for him to enter into any explanation of the need for legislation of this kind.

Although, in the case of Oudh, the subject was not so complicated as it had been shown to be in that of the Panjáb, by reason of the comparatively short period intervening between the annexation, or rather the re-occupation, of Oudh and the date of the Indian Councils' Act, and the consequently small number of orders to be dealt with, yet there also the advantage of a simple declaration of what must be deemed to constitute the law of the province would, he thought, be generally acknowledged.

The task of sifting the various orders of Government during that period and distinguishing between those properly having the force of law, and those of a purely executive character, was entrusted to a committee of officers of local

experience of which the present Judicial Commissioner was the President. The Committee's selection of orders having the force of law was described in their report to have been guided by an opinion of the Advocate General of Bengal expressed in a letter to the Government of India, dated the 13th September 1864, to the following effect:—

"I am clearly of opinion that the rules, laws and regulations referred to in section twenty-five are such as if passed for the regulation provinces since the 22nd April 1834, must have been passed by the Council of the Governor General in its legislative capacity. * *

"I think it is clear that the section must be read as applicable to such rules and regulations as were in the nature of laws affecting rights or imposing punishments, and that any rules or orders which in their nature were only rules for the guidance of a department or for the action of the executive, and which could be, and always have been, issued by the Government in its executive capacity merely, do not come within the section."

The result of the Committee's action on this principle was condensed in a volume of extremely moderate dimensions, as compared with that exhibited to the Council in connection with the similar Bill for the Panjáb. The collection of orders and rules which that volume contained commenced with the Government letter of the 4th February 1856, which laid down in the most comprehensive manner the rules which were to govern every department of the administration of the province at the time of its annexation to British India. Much of those rules had since been superseded by the introduction of the Codes; but some of considerable importance survived.

For example, the reference in somewhat loose and general terms to the Panjáb Civil Code contained in these orders had been held by the Privy Council to render obligatory the adoption of the principles of the Code as the basis of the administration of justice in Oudh. The extent to which these principles were to be applied, as also the degree of permanence intended to be given to their operation, must, he thought, be considered extremely doubtful; for in the letter of Government, to which he had referred, occurred the following passages:—

"But it will not escape your observation that, in the preparation of the rules under notice, much attention has been given to the *lex loci*, and that, specially in matters relating to inheritance, marriage, divorce and adultery, adoption, wills, legacies and partitions as well as in all commercial transactions, a due regard to local usage has been enjoined. It cannot of course be supposed that the *lex loci* or local custom in provinces differing so widely as the Panjáb and Oudh is in all or even in many respects identical, and it follows that those provisions of the rules, which rest on the *lex loci* in the Panjáb, cannot with any propriety, or without risk of injurious failure, be extended to the province of Oudh.

"While then the Governor General in Council directs your attention to this collection of principles of law as calculated to afford material assistance in the absence of any better or more appropriate treatise, he refrains from requiring the strict observance of them, until it can be ascertained how far they are applicable to the peculiarities of the province and the customs of its people. With this end in view, His Lordship in Council desires me to suggest that all the Commissioners and District Officers and the most experienced of the Assistants, should be required to study the principles of law in their daily application to the business brought before the Civil Courts, and after the lapse of a twelve-month or more, as may be hereafter determined, to report to the Judicial Commissioner the opinions which they may have formed to the applicability of the 'rules of law to the people of Oudh,' and to offer at the same time any remarks and suggestions which may have occurred to them."

Within a little more than a year after the promulgation of these directions, the whole province was reduced to a state of anarchy by the mutiny of 1857, and it appeared from the subsequent letter of Government, dated 6th October 1858, that no such report was made up to that date. From the absence of any reference to the matter in the Committee's report, it was to be inferred that no such investigation of the subject, as was contemplated by the orders of Government, had ever been made up to the present time.

It would clearly be necessary to restrict the operation of the principles contained in the Code to the extent to which they might be found to be consonant to the practice of the Oudh Courts during the last twelve years. This was the only question connected with the framing of the Bill, which he was

now asking leave to introduce, which presented any difficulty. The rest was very simple. There were certain rules of procedure in force in the Panjáb which were applied to Oudh by the orders of Government, dated 20th January 1859. There was a circular letter based upon an order of Government in regard to the record of rights of sub-proprietors and middle-men. The rules regarding such rights had been superseded for the most part by the enactment of Act XXVI of 1866. The only object in declaring them to have the force of law, was to give validity to past proceedings. There was also a rule as to the award of a fixed percentage to the finder of hidden treasure, and an order in regard to the employment of juries in the adjudication of civil cases in Lucknow.

Some doubt appeared to exist as to the law of limitation of suits now in force in Oudh, and appended to the Committee's report was a rather long correspondence on the subject ranging over several years and terminating with no satisfactory solution of the question at issue. The importance of that question was, however, very much diminished by the recent enactment of a new limitation law which would come into force in Oudh, as elsewhere, about two years' hence. All that had to be done now, therefore, was to declare what must be considered to have been, and to be, the law on this subject until the new Act came into operation, and to provide for the legal validity of past proceedings so far as they were affected by this question.

It was thought, moreover—but on this subject some doubt was felt—that the system of registration of deeds heretofore in operation in Oudh had not the force of law. Here, again, all future difficulty was avoided by the application of the new Registration Act. It would seem, however, in any case to be immaterial whether the force of law was or was not conceded to the present system of registration in Oudh, for that system not only made no registration obligatory, but apparently did not give any prescribed superiority to the registered over the unregistered document.

One useful result of this scheme for declaring the law in force in our more recently acquired territories would be the effacement of all distinction between the so-called "regulation" and "non-regulation provinces." That distinction was purely nominal, for it would be found that every regulation that was still operative in the older was practically in force in the more recently acquired provinces. Indeed, in one sense the latter would appear to be more overlaid with regulation law than the former, for apart from the fact of the Indian Councils' Act of 1861 having given the force of law to a mass of rules and orders promulgated by the Executive Government, he found from the volumes which described the regulations in force in the Panjáb and Oudh—and he confessed that the discovery was rather mortifying, as he had taken great interest in the work of consolidation and replacement of the regulations by modern enactments—that, for the purposes of these provinces, the 'spirit' of old regulations decently buried and put away in the repealing schedules of the consolidation Acts by which they had been superseded, was held to have survived their corporeal extinction.

The only places to which the term "non-regulation" could now aptly be applied, were those districts and hill tracts along our frontiers which had been expressly placed beyond the pale of the mass of our laws, whose degree of civilization and material progress were better suited to the patriarchal, than the legal, system of administration.

The Hon'ble Mr. Stephen merely wished to add one word to what had fallen from his hon'ble friend. He entirely concurred in the observations with which he had closed his speech. He would be sorry that it should be supposed that the process at present going on with regard to the law of this country was calculated to render it more intricate or difficult. On the contrary, it was a process of simplification, and its result would be to render the law less technical

and obscure. At present, in provinces like Oudh and the Panjáb, there was considerable difficulty in ascertaining what the law was; and in Burma, as had been pointed in a striking pamphlet by Mr. Broughton, the present Administrator General, the condition of things was such that, supposing it to be the interest of a sufficiently skilful lawyer to go into the matter, difficulties might ensue which it would be really extremely difficult to meet except by express legislation. In fact, when rules and orders, such as are called for by the necessities of a newly conquered province, were suddenly invested with the fixity of law, it was certain that, before long, complications and embarrassments would ensue, for which legislation was the only cure. It was on this account that the present measure, and others of a kindred nature, had become a matter of necessity.

The Motion was put and agreed to.

GENERAL REGULATIONS AND ACTS (DEHRÁ DÚN) BILL.

The Hon'ble MR. COCKERELL also presented the Report of the Select Committee on the Bill to bring the Dehrá Dún within the operation of the General Regulations and Acts.

The Council adjourned to Tuesday, the 11th July 1871.

H. S. CUNNINGHAM,

Offg. Secy. to the Council of the Governor General for making Laws and Regulations.

SIMLA;
The 4th July 1871.

No. 26 of 1871.

SUPPLEMENT TO

The Gazette of India.

SIMLA, SATURDAY, JULY 15, 1871.

OFFICIAL PAPERS.

A SUPPLEMENT *to the* GAZETTE OF INDIA *will be published from time to time containing such Official Papers and information as the Government of India may deem to be of interest to the Public, and such as may usefully be made known.*

Non-Subscribers to the GAZETTE *may receive the* SUPPLEMENT *separately on a payment of six Rupees per annum if delivered in Calcutta, or ten Rupees eight annas if sent by Post.*

No Official Orders or Notifications, the publication of which in the GAZETTE OF INDIA *is required by Law, of which it has been customary to publish in the* CALCUTTA GAZETTE, *will be included in the* SUPPLEMENT. *For such Orders and Notifications the body of the* GAZETTE *must be looked to.*

GOVERNMENT OF INDIA.

DEPARTMENT OF AGRICULTURE, REVENUE, AND COMMERCE.

REVIEW BY THE SANITARY COMMISSIONER WITH THE GOVERNMENT OF INDIA OF THE ANNUAL REPORTS OF THE LOCAL SANITARY COMMISSIONERS FOR THE YEAR 1869.

Extract from the Proceedings of the Government of India in the Department of Agriculture, Revenue, and Commerce (Sanitary),—Nos. 21-30, *dated Simla, the 6th July* 1871.

READ again a Circular Resolution of the Home Department, Nos. 241 to 250, dated the 6th July 1870, on the general review by the Sanitary Commissioner with the Government of India of the annual local sanitary reports for 1868.

Read a letter No. 309, dated 25th May 1871, from the Sanitary Commissioner with the Government of India, submitting a general review of the annual reports of the local Sanitary Commissioners for the year 1869.

RESOLUTION.—The Governor General in Council has read the review of the Sanitary Commissioner with the Government of India, with much interest, and directs that it be circulated for information and guidance to all Local Governments and Administrations.

2. His Excellency in Council desires that special attention be paid to the suggestions contained in paragraph 87 of the review, and that, in future, sanitary reports should be prepared according to the method therein described.

3. There has been great delay in the submission of the reports of the local Sanitary Commissioners, and the Governor General in Council desires that the several Local Governments and Administrations will insist upon their reports being submitted in future not later than the 1st of March of every year.

Government of Bengal,
" North-Western Provinces.
" Punjab.
Chief Commissoner of Oudh.
" " Central Provinces.
" " British Burmah.
Resident, Hyderabad.

ORDER.—Ordered, that a copy of the foregoing Resolution, together with a copy of Dr. Cuningham's review for 1869, be forwarded to the Local Governments and Administrations noted in the margin for information and guidance.

Ordered also, that a copy be forwarded to the Governments of Madras and Bombay, with the suggestion that, in order to secure uniformity in the preparation of the sanitary reports, the plan described in paragaph 87 of the review may, if there is no objection, be adopted by the Sanitary Commissioners under those Governments.

Ordered also, that a copy of the above Resolution be forwarded to the Sanitary Commissioner with the Government of India for information, and with the remark that the Government of India will await the receipt of a further communication on the subject of a cholera map.

Ordered also, that a copy of the above Resolution, and a copy of Dr. Cuningham's review of the reports for 1869, be published in the *Gazette of India*.

(True Extract.)

J. GEOGHEGAN,
Under Secretary to the Govt. of India.

From J. M. CUNINGHAM, ESQ., M. D., Sanitary Commissioner with the Government of India, to the Secretary to the Government of India, Home Department,—No. 309, dated Simla, the 25th May 1871.

General Review of the Annual Reports of the local Sanitary Commissioners for 1869.
From Home Department, No. 364, dated the 27th September 1870.
To Home Department, No. 478, dated the 29th idem.

WITH reference to the correspondence noted in the margin, I have the honor to submit a general review of the Annual Reports of the local Sanitary Commissioners for the year 1869.

Several of these Reports were very late in submission.

2. These reports reached me in the following order and on the date which is noted opposite to each of them:

From	Berar,	13th June	1870.
"	Punjab,	11th October	"
"	Oudh,	22nd "	"
"	British Burmah,	"	"
"	Bengal,	11th November	"
"	N. W. Provinces,	30th "	"
"	Central Provinces,	2nd March	1871.

The delay was in a great measure caused by the great sickness and the many important matters which consequently demanded attention.

3. Although somewhat earlier of arrival than they were in the year previous, they all, with one exception, came too late to be of use in the preparation of my General Report for 1869. The year was characterized by unusual, sickness: cholera, small-pox, and fever were extremely prevalent over great portion of the country, and the matters which demanded investigation were therefore much more numerous and important than ordinary. In estimating the time occupied in the preparation and submission of the different reports, regard must be had to the manner in which these investigations have been conducted and recorded. For example, the Report of the Sanitary Commissioner of the Central Provinces did not reach this Office till the 2nd of March 1871; but it contains the results of a most painstaking enquiry into the great epidemic of cholera from which the people in these Provinces suffered so heavily in 1869, and this enquiry was in a great measure conducted during the early part of 1870, in the course of a tour through that part of the country whith had been chiefly affected.

4. But while making every allowance on account of the work which attends on the proper discharge of the duties of the Sanitary Commissioners, it is indispensable that their annual reports should be submitted at a much earlier date than hitherto. The statistics of sickness and mortality among the troops and prisoners cannot be considered with any degree of satisfaction apart from the history of disease among the people generally. All the information which can be procured from every source must be examined at one and the same time, and the Sanitary Commissioners will therefore, I trust, submit their annual reports in future in time to enable me to have the advantage of studying them in connection with the statistics of troops and prisoners, and so to prepare a full and complete report for the year regarding all sections of the community.

It is very important that these reports should, in future, be submitted at a much earlier date.

5. The division of their reports into certain sections which I recommended last year has not been followed by all the Sanitary Commissioners, nor, indeed, has it been fully adopted by any of them; but I shall endeavour, as far as possible, to keep to such an arrangement in this general review of their contents. And I would at the same time observe that if some such division as I have proposed, or any other which the Government may think best, were generally followed by all the local Sanitary Commissioners, it would greatly facilitate reference, and thereby materially aid not only in summarizing the facts collected from various sources, but also in drawing deductions from them.

No general plan has been followed in these reports.

6. I shall now proceed to consider the information which these reports contain as regards—

Their contents will be considered under six heads.

I.—Vital statistics.

II.—The history of each of the chief diseases as it affected the several Provinces during the year.

III.—The meteorology.

IV.—The general condition of the people as influenced by any deficiency in the crops, or by the unusually high price of food.

V.—The personal investigations and proceedings of the Sanitary Commissioners.

VI.—Sanitary progress during the year.

7. Although the Madras and Bombay reports do not properly fall within this review, I shall take advantage to the opportunity of collecting from them any prominent facts which illustrate the history of disease or the sanitary condition of the people in those parts of India.

Any prominent facts contained in the Madras and Bombay reports for 1869 will at the same time be noticed.

8. With the exception of a few statements regarding cholera in some Districts, and these are confessedly inaccurate and incomplete, the Sanitary Commissioner for Bengal gives no vital statistics for his Province. In his remarks on this most important question, Dr. Smith observes that it had been intended to commence mortuary registration from the 1st of November 1869, but that, owing to unforeseen difficulties, its introduction was postponed till the 1st July 1870. How far these arrangements have actually been carried into effect I am not aware; but, judging from the very imperfect information which is obtainable regarding cholera in the several Districts of the Lower Provinces during 1870, and during the past months of the current year, it would seem that the system is not yet in good working order.

See I., Vital Statistics.

None are available regarding the Lower Provinces.

9. Bengal Proper is the only Province of India from which no statistical information regarding the deaths among the people in any part of it during the year 1869 can be obtained. In the North-Western Provinces, the Punjab, Oudh, the Central Provinces, and Berar, a general system of mortuary registration has been for some time in operation. In British Burmah it has as yet been confined to 17 towns, but, with the single exception of Calcutta, no information can be obtained regarding the number of deaths among the people in any part of the Lower Provinces. The want of such data is a serious loss as regards the mortality attendant on all diseases, but the want is chiefly felt in connection with the history and geographical distribution of cholera. If the delta of the Ganges be the home of this disease, then every fact connected with its appearance within the limits of this endemic area, and with its progress beyond these limits, is of the greatest importance. But, in truth, without vital statistics the Sanitary Commissioner wants the foundation on which all his other work must be built. The supervision of the registration of deaths amongst so large a population and over so great an area as that of the Lower Provinces is undoubtedly no small work, but it is one which is of primary importance and which much demands attention.

The want of this information is a great loss, especially as regards the history of cholera.

For the North-Western Provinces they are imperfect.

10. The registration of deaths in the North-Western Provinces shows that 1869 was a year of very unusual sickness and mortality. All the great causes of death—cholera, small-pox, fevers, and bowel complaints—were very prevalent. The comparative results in different Districts as shown in the one general table which is given in the body of the report, appear to convey a tolerably correct estimate of the relative prevalence of these diseases, but the mortality must be greatly understated, and thousands of deaths must have escaped registration. The death-rates vary in different Districts from 5·8 per 1,000 in Bustee, a ratio which must be the result of very imperfect registration, to 56 per 1,000 in Jhansie, where famine and terrible sickness told heavily upon the people. The total death-rate of the Province is given as 17·9. The details which are furnished in Appendix A are manifestly incorrect. The new scheme of registration had not then come into force, and the particulars which have been given regarding the causes of death during the year, such as a "broken heart," "eating mud," and many others which might be instanced, are chiefly valuable as illustrating the necessity of a better system. During the last few months the standard forms have been brought into use, and the results of each month's registration are regularly published in the North-Western Provinces *Gazette*.

In the Punjab they are more complete and bear evidence of greater accuracy.

11. In the Punjab, where the importance of a good system of registration has from the first attracted the attention which it so justly deserves, the details are much more complete and bear the impress of greater accuracy than those of the North-Western Provinces. Much still remains to be done before the returns can be accepted as embodying more than an approximation to the truth, but, "lamentably imperfect," as they are still admitted to be by the Sanitary Commissioner, they are yet of great value, not only for the information which they contain regarding the general history of disease, but as the basis of more successful results. The death-rate for the Province was 26 per 1,000, varying from a minimum of 16, to a maximum of 38 in different Districts. In the towns, the statistics of which although included in the District tables are also shown separately, the death-rate equalled 35 per 1,000—a result which points rather to greater accuracy than any special mortality. In some of them the death-rate was extremely high. At Umritsur it was 69, at Delhi 46, at Sajanpore, in the Goordaspore District, 80, and at Dera Nanuk in the same District 84 per 1,000. A very important step has been taken in making the heads of families responsible for reporting all births and deaths. As a commencement this rule has been applied to only the principal station of each District (excepting Umballa and Abbottabad, which have for the present been omitted); but the Sanitary Commissioner recommends that it should be gradually extended as the people come to understand the uses and object of registration until at last the whole Province is included in its operation. The new standard forms for showing the results of registration had not been introduced. Some delay had occurred owing to a reference on the question of establishment required for the purpose, but monthly statements in the prescribed form now appear in the local Gazette. The statement which the Sanitary Commissioner has appended to his report afford much information, but it is very desirable that one and the same system should be adopted throughout India. Without this, comparison is almost impossible, and no satisfactory examination can be made of the returns from the different Provinces without an infinity of labor which may, to a great extent, be obviated by uniformity.

The details from Oudh are meagre.

12. All the data regarding the deaths and causes of deaths in Oudh during the year 1869 are contained in one table in the body of the report. The deaths registered from all causes equalled 16·8 per 1,000, a ratio which, especially in a year of such great sickness, must be much under the truth. In different Districts it varied from 9·1 to 35·6 per 1,000. The information is very meagre and imperfect, nor is mention made of any measures which have been taken with a view of obtaining more reliable results. With the introduction of the new standard forms some improvement may be expected, but it does not appear whether arrangements have yet been made to adopt these forms or not. As yet no monthly statements have appeared in the local Gazette, in conformity with the instructions which have been issued by the Government of India.

In the Central Provinces, as in the Punjab, registration has received much attention.

13. In the Central Provinces the proportion of the population under systematic registration in 1869 was much the same as in the year previous; but when cholera became prevalent, it was extended to the whole of the people with the exception of those in the feudatoryships and zemindarees which are not under the direct administration of the Government. It thus happens that while the information regarding the other great causes of deaths refer to 4,862,516, the details regarding cholera include 6,879,738. With the commencement of 1870 the new forms have been brought into use, and the whole of the inhabitants, with the exception of those in the zemindarees and in some of the more distant villages of the wilder Districts have been embraced in the registration. Dr. Townsend's Mortuary Tables for the year, although still confessedly imperfect, afford very valuable information and evince the care and attention which in the Central

Provinces as in the Punjab have been bestowed on the subject of registration. The total death-rate for the Province on the deaths registered was 35·9, varying from a minimum of 13·6 in the District of Seroncha to 61·1 in the District of Jubbulpore. In many of the towns the loss of life was terrible. In twenty-three of the forty-five, regarding which particulars are given separately, the ratio was over 40 per 1,000. In fifteen of the twenty-three it was over 50, and these fifteen again contain instances of mortality rising to 60, 70, 80, 90, 100, and in the case of Jubbulpore to 123 per 1,000.

Berar was not placed under a separate Sanitary Commissioner until April 1870.

14. Berar was taken from the Central Provinces and placed under a separate Sanitary Commissioner only on the 2nd of April 1870. The population under registration in 1869 amounted to 2,074,614 or nearly 93 per cent. of the whole people of the Province. The registered deaths give a ratio of 22·8 per 1,000 of the population. In the District of Woon it was only 14·9, in Oomraotee 30·4, and between these extremes there were varying rates of mortality. The standard forms, it is noted, were to have been brought into use in 1870. It is very desirable that the monthly results should be published for general information. In the absence of any local Gazette the statement might conveniently appear in the Gazette of the Central Provinces.

In British Burmah only 17 towns had been embraced in the registration.

15. In British Burmah the registration of vital statistics had been introduced into only seventeen towns; but from the 1st July 1870, a system based on that laid down by the Supreme Government for the whole of India was to come into force. The Chief Commissioner trusted that, with care and attention on the part of District Officers, statistics for the whole Province would thereafter be obtained.

The returns from Mysore being for the official year are not comparable with the others.

16. The statements from Mysore relate to the official year 1869-70, and cannot, therefore, be compared with those of the other Provinces which embrace the year 1869. Moreover, the death-rate of about 8 per 1,000 which these statements show, as the Chief Commissioner remarks, cannot but be regarded as much too favorable, and many deaths must have been left unreported. From the 1st July 1870, the new system of registration was to be introduced, and it was hoped that more accurate results would then be obtained. The total population of Mysore, it may be noted is stated to be 4,056,766, of which the details are as follows:

Europeans	4,151
Eurasians	2,855
Native Christians	8,186
Mahomedans	189,272
Hindoos	3,839,679
Buddhists and Jains	12,623
Total ...	4,056,766

Registration in Madras and Bombay Presidencies.

17. The total population of the Madras Presidency is estimated at 26,097,021, and of these 24,633,127 had been included in the registration, the difference representing zemindaree tracts and remote villages from which it had not been found practicable to obtain returns. The returns show a total mortality of 18·3 per 1,000; but as the Sanitary Commissioner remarks, the deaths are in all probability much under-stated. The ratios vary in different Districts from 9·8 to 24 per 1,000. From the 1st July 1870, the standard forms were to be employed.

The population under the Government of Bombay in 1869 is estimated at 13,901,863. A general statement is given for the year, and details regarding the civil population of each Collectorate. The total death-rate is estimated at 20·4 per 1,000. It does not appear what orders have been issued regarding the adoption of the new forms, but the Sanitary Commissioner observes that the attempt to obtain information regarding the causes of death, in even the most simple form, had hitherto failed; and it was feared that a general classification such as that adopted in the new statements, which is somewhat more complicated than that hitherto in use, could not be followed with accuracy.

The general mortuary statistics of India, so far as obtainable, are shown in the annexed table.

18. In the annexed statement, the general results of mortuary registration are shown throughout British India:

Statement showing the number of deaths registered in the various Provinces of British India during the year 1869.

Province.	Estimated population.	Population under registration.	Number of Deaths from						Total deaths.	Ratio of deaths per 1,000.
			Cholera.	Small-pox.	Fevers.	Bowel Complaints.	Injuries.	All other causes.		
Bengal.			No statistics.							
North-Western Provinces	29,588,653	All	69,542	90,770	246,838	31,452	Not stated.	91,151	529,753	17·9
Punjab	17,448,865	„	9,258	53,195	272,946	30,953	4,832	82,637	453,821	26·
Oudh	11,198,095	„	23,134	21,564	87,795	6,235	3,200	46,446	188,374	16·8
Central Provinces	9,000,000	4,862,516	51,387	16,849	68,999	12,550	1,725	23,488	174,998	35·9
Berar	2,231,565	2,074,614	10,947	6,365	12,917	6,154	818	10,137	47,338	22·8
British Burmah	2,395,985	322,728	1,025	1,037	2,415	630	122	4,140	9,369	29·
Madras	26,097,021	24,633,127	21,034	17,448	132,346	Not stated separately.	9,445	271,708	451,981	18·3
Bombay	13,901,863	All	52,365	12,673	Not stated separately.	Not stated separately.	4,719	Not stated separately.	283,878	20·4

19. The returns are still too imperfect to admit of any satisfactory analysis of their contents beyond what is here exhibited. The relative mortality among the rural as compared with the town population, the comparative death-rates at different ages and among the two sexes, as well as the proportion due to particular months and seasons, are all questions of very great interest, but no correct data are yet available for their consideration. It will be observed that the highest mortality 35·9 per 1,000, occurred in the Central Provinces, where the great epidemics of the year sufficiently account for the results. Next follows British Burmah, with a death-rate of 29 per 1,000, but the returns are collected from a very limited portion of the population. In the Punjab the ratio was 26, and in the other Provinces it varied from 22·8 in Berar to 16·8 in Oudh. Judging from the very unhealthy character of the year, the deaths in the North-Western Provinces, in Oudh, and also in Madras and Bombay, would appear to be much under-stated. As most of the Sanitary Commissioners remark, the errors in the registers are errors of omission, and had all the deaths been entered, the ratio for all the Provinces would doubtless have been more or less in excess of those which are here represented.

The statistics are not yet sufficiently accurate for any satisfactory analysis.

20. No mention has yet been made of the registration of births. In several of the Provinces, and especially in the Punjab, the Central Provinces and Oudh, attempts have been made to collect data on this important point; but the difficulties which attend such an attempt are very much greater even than those connected with the registration of deaths, and the results as yet are very imperfect.

The registration of births, though attempted in several of the Provinces, is very imperfect.

21. On a review of all that has yet been done to introduce a general system of a registration among the people of India, it must be admitted that the results of 1869, imperfect as they are, contain most important information, and encourage the hope that they will year by year improve and increase in value. The difficulties which have to be contended with in carrying out any such system in India are but little understood and appreciated by those who have had no experience of the country and whose ideas of registration are derived from what has been done in Great Britain. The vast area embraced in each Province, the millions of people to be included in the registration, the fact that in many Districts, each of which is larger than a county of England, and many of them as large as several counties put together, there is generally but one educated medical officer who could accurately certify to the cause of death in any case, and the want of proper machinery for registration are all obstacles of no small magnitude; and, regarding what has been effected in relation to these difficulties, I am rather astonished at what has been done than disappointed at the errors and omissions. The system is yet in its infancy; it is new to the people, and, until they in some degree understand its aim and objects, they will not render that willing assistance which is indispensable to its success. The special attention of the Sanitary Commissioner in every Province should be devoted to registration,—it is, as I may say, the backbone of their work, and, where it is neglected, the sanitary condition of the people can never improve and flourish. When the results of registration for 1870 come to be reviewed it is, therefore, to be hoped that no Province will be found without its vital statistics collected and compiled with the greatest care, and that all the Sanitary Commissioners will evince the same appreciation of the value of mortuary registration as has been shown by Dr. DeRenzy in the Punjab and by Dr. Townsend in the Central Provinces.

Considering the great difficulties which have to be encountered, the results of registration in 1869 are encouraging.

22. I shall now pass to a consideration of the diseases which chiefly contributed to the mortality of the year, and of these the first on the list, though not the most destructive in all the Provinces, is cholera. In nearly all of them cholera was extremely and unusually prevalent, and it would be impossible within the limits of any general review to enter fully into the history of this vast epidemic. Its main features have been already discussed by Dr. Bryden in connection with the views which he has expressed in his work on cholera—its geographical distribution and relation to natural influences. I shall only attempt to state shortly the most important facts which have been recorded by the Sanitary Commissioners in their respective reports, and shall then consider the opinions which they have based upon them. My object is not to urge any particular views with regard to the disease, but merely to examine the evidence which has been adduced and to ascertain how far any of the theoretical opinions which have been advanced in explanation of the facts of the epidemic are supported by this evidence.

Section II.—History of the chief diseases during the year.

A cholera was very prevalent in 1869.

23. As deaths were not registered in Bengal during 1869, no precise information can be obtained regarding the disease. The Sanitary Commissioner has summarized all the data which he could procure, but from several Districts no reports were received, and in none of them have the facts been so fully and carefully recorded as to embody any connected and complete history of the disease throughout the year. Without registration no such data can be obtained. So far as can be judged from the statements of the Civil Surgeons, cholera was severe in the

Very little information is to be had regarding its appearance in Bengal.

Bhaugulpore, Monghyr, Gya, Patna, Sarun, Tirhoot, and Chumparun Districts of Behar, and also in Assam. Some few instances are given in which the disease appears to have been spread by human intercourse, but the Sanitary Commissioner does not incline to the opinion that this was the agency by means of which it was disseminated. "It may be asked," he observes (page 43), "could quarantine operations of the most complete and perfect description have put a stop to the spread of cholera during the past year? I believe it would have failed to do so, because there is much evidence to show that the disease appeared simultaneously and independently in many places; because, in a large number of such instances, although special enquiries were instituted to the subject, importation could not by any means be traced, because in certain localities free communication with infected places went on without any manifestation of the disease occuring; and *lastly*, because its often sudden and simultaneous disappearance over broad tracts of country tends to prove its dependence on influences far other than those of mere human agency." Within the endemic limits of cholera, any investigation into the share which human intercourse may have in spreading the disease is beset with peculiar difficulties, but such facts as Dr. Smith here records are of great importance in the enquiry, and are well worthy of being recorded in detail. Without specific evidence as to dates and places and the number of cases or deaths, it is impossible to form any correct opinion with regard to them. No map has been furnished with this report to illustrate the distribution and comparative incidence of cholera in different parts of Bengal, but, in the absence of any statistics for the Province, it could not well have been prepared in such a way as to be of any real value.

In the North-Western Provinces the mortality from cholera was very heavy.

24. In the North-Western Provinces the mortality from cholera was very heavy; no less than 69,542 deaths are recorded under this head, or 2·3 per 1,000 of the population. The disease was, however, by no means equally distributed. The Districts of Lullutpore, Ghazeepore, Jaloun, Azimgurh, Jhansie, Mirzapore, Benares, Goruckpore, Humeerpore, and Bustee suffered most, the ratio varying from 10·9 in the first of them to 3· in the last. From three Districts—Kemaon, Gurhwal, and Turaie—no deaths from cholera were reported. In fourteen of them the mortality from this cause was under 1 per 1,000, and in the remaining eight it was from 1·3 to 2·8 per 1,000. In eighteen out of the thirty-five Districts of the Province, deaths from cholera were recorded in every month of the year. The statistics regarding the police, the accuracy of which can be relied on, shew that the force suffered most in those Districts in which the mortality mong the general population has been recorded at the highest,—evidence which, as the Sanitary Commissioner's remarks shew, that, although the records of the general registration are inaccurate as regards the actual number of deaths, they are not altogether valueless, and contain a fair estimate of the relative incidence of the disease in different parts of the country. No map accompanies Dr. Planck's report.

The severity of the disease in the Punjab was confined to a few places.

25. With the exception of Muzuffergurh, every one of the thirty-two Districts in the Punjab suffered from cholera, but the severity of the disease was confined to a few places. In twenty-one of the Districts the mortality from this cause did not exceed 0·10 per 1,000, in seven of them it was above 0·10, but under 1·0 per 1,000. In the Kohat District it was 3·62, in Umritsur 4·33, and in Peshawur 5·99 per 1,000. On these last three the chief violence of the epidemic fell, but even this does not shew the remarkable localization of the severity of the outbreak; for the mortality, although shewn for the Districts as a whole, really fell chiefly, and in the case of Umritsur almost entirely, on the capital city: the rural population suffered little. Thus, in the Peshawur District as a whole, there were 2,985 deaths from cholera reported, but of these 1,480 occurred in the city. In the Umritsur District, out of 3,608 deaths, 3,041 were in the city. In the Kohat District, out of 508 deaths, 328 took place in the city and cantonment. Of the total of 9,258 deaths from cholera, it thus appears that no less than 7,101 occurred among the people of these three Districts, and of these again 4,849, or nearly five-sevenths, occurred among the people of the three cities. Some particulars are given regarding the outbreaks at these places, and also regarding the disease as it appeared at Lahore, Goordaspore, Jullundur, Hissar, Sirsa, Subathoo, Rawul Pindee, and Bunnoo. To attempt to state even the main facts regarding its history in all these Districts would be to recapitulate much of what Dr. DeRenzy has already so well described. Some of them must, however, be considered when I come to discuss the opinions which he has expressed with regard to them. Two maps illustrate the report,—one shewing the relative prevalence of cholera for the whole Province, and the other the details regarding the epidemic in the Peshawur Valley.

Particulars regarding the cholera in Oudh are wanting.

26. It appears from the general table already given that in Oudh 23,134 persons died of cholera during the year 1869, or a ratio of 2·0 per 1,000. The disease was epidemic over nearly the whole Province, but no particulars are given beyond the data which appear in the general table. The deaths varied from 0·09 per 1·000 in the Kheeree District to 6·1 in Rae Bareilly. No map accompanies the report, nor is there any record of the number of deaths which occurred in each month; but this last information was subsequently supplied at my

request, and a table embodying it appeared in my Annual Report for 1869. There was a marked persistence of the disease throughout the Province, especially in the Districts of Fyzabad, Sultanpore, Seetapore, and Pertabgurh.

A very full account of the history of cholera in the Central Provinces has been given by Dr. Townsend.

27. The epidemic in the Central Provinces was made the subject of a most painstaking and careful enquiry: great part of the country which chiefly suffered was visited by Dr. Townsend, and the facts investigated on the spot. Out of a population of 6,879,738 to which the registration of the mortality from cholera was espicialiy extended, 57,079 deaths from this disease were recorded (Table No. 20). As shown in Table No. 18, out of a more limited population of 4,862,516, the deaths were 51,387, or 10·5 per 1,000. The severity of the disease fell chiefly on the people in the Mundla, Saugor, Dumoh, Belaspore, Raepore, and Nursingpore Districts, in which the mortality it occasioned varied from 21·3 in the first to 10·4 in the last. In Seroncha no deaths were reported. In the remaining twelve Districts the ratio of loss from cholera was from 9·9 in Wurdah to 0·4 in Chindwarra. In the town of Mundla the cholera death-rate was no less than 53·2, in Raepore it was 34·2. Many other towns suffered severely. From these facts it will be seen that the disease was both wide-spread and very fatal, very much more so than in any of the other Provinces. In 1868 it had also been severe in the Central Provinces, but the area over which it then appeared was more confined and the deaths numbered only 10,400 as compared with 57,079 in 1869. The excessive mortality in these two years may again be contrasted with the singular immunity which the people have enjoyed in 1870, when, throughout the whole Province, only 120 deaths from cholera have been registered. The details of certain outbreaks which are given by Dr. Townsend are of much interest. A map accompanies the report, and is of great assistance in studying the incidence and progress of the epidemic.

In Berar the disease was very generally diffused.

28. In Berar 10,947 deaths were ascribed to cholera during 1869, or 23·1 per cent. of the total mortality. The ratio of loss varied in the Districts from 4·7 in Bassim to 8·76 per 1,000 in Oomraotee, in the cities from 2·1 in Bassim to 8·4 in Akola. The epidemic was very generally diffused throughout the whole Province, but no very excessive mortality appears to have occurred in any one place. The Sanitary Commissioner, as I have already stated, did not assume charge till April 1870, and has been unable fully to detail the history of the outbreak, or to supply any map in illustration of his report.

The information from Burmah relates only to 17 towns.

29. As the statistics in British Burmah were confined to seventeen towns, the information regarding the general history of the disease throughout the province is incomplete. In all but four of them deaths were attributed to cholera, and in Akyab there was a severe outbreak to which 700 deaths were supposed to be due. No map accompanies the report.

The annexed statement shews the monthly mortality from cholera in each of the Provinces.

30. In the annexed statement, the extent of the mortality from cholera in each Province for each month of 1869 has been entered, and, for the purpose of comparison, the returns from Madras and Bombay have also been included. In the report of the Sanitary Commissioner for Bombay I have been unable to find a full detail of the deaths by months, but at page 197 he writes—"The season of greatest prevalence of cholera in 1869 was, during the three months—May, June, and July—during which considerably more than half the total fatal cases of the whole year occurred. The greatest number of reported deaths is in July, but the difference is trifling, the figures for the three months being 9,679, 9,525, and 9,764, respectively. December shows the lowest figure—275." In Madras the first maximum was in July, the disease then declined till October. In November in again rose, and in December it was nearly as fatal as it had been in July. In the North-Western Provinces and also in the Punjab the highest point was reached in August; till then it had gradually ascended, and from then it gradually diminished. In Oudh there was a first decided rise in June, a lull in July, and then a higher rise than ever in August. In the Central Provinces the mortality from cholera gradually rose during the first five months of the year. In June the deaths were nearly twice as numerous as in any other month, and then they steadily declined.

Statement showing the deaths from Cholera registered in the different Provinces in each month of 1869.

PROVINCES.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	TOTAL.*
Bengal Proper.	No statistics.												
North-Western Provinces	151	216	1,284	3,148	4,937	11,394	14,339	21,092	6,909	4,318	823	180	68,691
Punjab	18	32	51	76	144	194	797	3,238	2,391	2,033	204	80	9,258
Oudh	327	177	689	2,614	3,394	4,149	3,548	4,239	1,725	1,521	491	260	23,134
Central Provinces	70	134	749	1,837	9,799	22,823	12,077	7,050	2,127	391	16	6	57,079
Berar	10	70	139	1,759	1,385	770	3,047	2,618	848	164	18	119	10,947
British Burmah.	No statistics for months.												
Madras	175	203	475	446	477	2,575	5,025	3,100	2424	1,907	2,198	4,067	23,072
Bombay	No statistics for months.			...	...	...	...	...	...	...	...	...	52,365

* These totals do not in all cases agree with those given in the previous statement; but as the object of this table is to illustrate the comparative monthly incidence of the disease, the discrepancies are of little consequence.

The opinions of the Sanitary Commissioner of the North-Western Provinces with regard to the epidemic are chiefly negative.

31. I shall now proceed to discuss the opinions which have been expressed by the different Sanitary Commissioners with regard to this great epidemic as it affected their respective Provinces. The data from Bengal are so imperfect that no satisfactory conclusions can be drawn from them. Dr. Smith's views have already been cited in connection with the few facts which have been recorded, and no further reference need, therefore, be made to the disease as it appeared in this portion of the country. Taking the statistics of the North-Western Provinces for 1869, and considering the persistence with which cholera showed itself, appearing in not a few of the Districts in every month, and in others in nearly every month of the year, Dr. Planck is inclined to believe "that cholera is always to be found in some part or other of almost every District from one year's end to the other" (page 8). In the eastern Districts especially the general opinion seems to be that the disease is endemic, and the Sanitary Commissioner thinks it "not unjust to suppose that the permanent home of cholera is extending from east to west, and that, consequently, the people of the North-Western Provinces are more and more likely to have the disease amongst them in an epidemic form in coming years." "That the rapid means of communication now in existence are likely to increase this tendency," he adds, "I think there can be no doubt." With regard to the first of these statements, it is difficult to form any correct opinion, because there is no doubt that very many of the deaths which are ascribed to cholera, especially in non-epidemic years, are really due to other diseases such as bilious fevers. The second remark would seem to imply that Dr. Planck believes in human intercourse as the chief means of spreading cholera; but the facts which he has recorded regarding the epidemic in the North-Western Provinces during 1869 do not tend to this conclusion. Seven instances only are cited in which it was attributed to importation (paragraph 35). "In all other Districts, either satisfactory evidence of its importation is said to be wanting, or its importation denied." "As regards the spread of the disease by personal intercourse," he continues, "and the danger to friends or other persons attending on cholera cases, the evidence is reassuring. With the exception of Meerut and Boolundshuhur, the evidence from all the Districts is, that no facts have come to notice showing that the disease has been so spread, or that any unusual danger attends the ministering to cholera patients." His general opinion regarding the epidemic is thus recorded: "Concerning the cause of cholera or the mode of its distribution, nothing definite, so far as I know, has been recorded in the past year; even the belief that cholera is distributed by means of the water-supply has been, I think, a little distributed by a record of the fact that, wherever cholera prevailed those attacked and those who escaped drank from the same wells. These conclusions are of only a negative character, but it is very much better to confess ignorance than to advance theoretical opinions which cannot be substantiated by facts. It appears to me that in any future epidemic very searching investigation should be made into its history. It would be quite impossible for the Sanitary Commissioner to visit more than a very small portion of the Province during any one season,—for the great mass of information regarding the disease, he must be dependent on his mortuary statistics and the reports of the Civil Surgeons; but if one District or even part of a District in which cholera had been most prevalent and fatal in 1869 had been selected for careful enquiry in the cold weather of 1869-70, much valuable information might have been obtained. Dr. Planck is of opinion that the great measure required for the prevention of cholera is "the improved sanitation of the Province generally, and especially of the principal centres of population," and of the soundness of this conclusion there can be little doubt.

The opinions of the Sanitary Commissioner of the Punjab are very decided.

32. Dr. DeRenzy's views as to the mode in which cholera is spread over any Province, and the medium through which it generally attacks a community with special violence, are very decided. At page 101 of his report he states, with reference to the first of these questions, "a humid atmosphere is as incapable of transporting the cholera virus from place to place as it was of transporting the potatoe from its original habitat to Ireland, the cinchona to Darjeeling, or the tea plant to our own Kangra Valley. In these cases human agency was indispensable to the transfer; it is equally so in the case of the cholera virus." On the second point he writes (page 104),—"when it was demonstrated in London that of all the conditions which favor the propagation of cholera, *viz.*, exposure to infection, bad drains, crowding and defective ventilation, poverty, and the unclean habits which too often attend it, low damp residence, imperfect medical relief, and water tainted with cholera discharges,—the most influential was cholera tainted water, it was practically established that the same relative importance would attach to this condition in all other parts of the world." Dr. DeRenzy, in fact, adopts Dr. Snow's water theory "that the cholera poison is swallowed and acts directly on the mucous membrane of the intestines; is at the same time re-produced in the intestinal canal and passes out much increased in the discharges; and that these discharges afterwards in various ways, but chiefly by becoming mixed with the drinking water in rivers or wells reach the alimentary canals of other persons and produce the like disease in them."

33. I cannot admit the accuracy of Dr. DeRenzy's statement when he asserts that, in London, the spread of cholera was demonstrated to have been dependent on *cholera tainted* water, but it is not my purpose to enter into any general discussion regarding this or any other point connected with the disease. I shall merely consider how far the two decided opinions which he has advanced are supported by the history of the epidemic as it appeared in the Punjab in 1869. And first as to human intercourse. Neither as regards the city or jail of Umritsur is there any evidence of importation. "The prisoners had been carefully guarded by quarantine, and their employment outside the wall discontinued." The fact that six of the men who were attacked had been employed in making hempen string, suggested to the Sanitary Commissioner the probability of the virus being imported in the hemp, but "there was no clear evidence to show that the hemp came from infected persons." It is stated generally that the villages in the neighbourhood of Umritsur seemed to be liable to attack in the ratio of their proximity to, and facilities to communication with, the city. At Lahore "the first case occurred at the Railway Station in a traveller just arrived from Umritsur, and the disease was for some time confined to the Sultan Serai or rest-house—a place where travellers from all parts put up, and in the Changer Mohulla." In none of the other Districts regarding which any particulars are given, Goordaspore, Jullundur, Goorgaon, Hissar, Sirsa, Rawul Pindee, and Peshawur, all of which suffered more or less from cholera, is there the smallest evidence to show that the disease had been imported, nor are even such general statements made as those above-quoted which would lead to the suspicion that such had been the case. As regards Peshawur, it is certainly noted that there had been a brisk grain trade, and that, therefore, more than the usual intercourse with Umritsur had taken place, but such vague evidence is of little value.

His opinion that cholera was imported into the different Districts of the Punjab is supported by few facts.

34. Dr. Ince, who, under Dr. DeRenzy's direction, made special enquiry into the circumstances connected with the spread of the disease throughout the Peshawur Valley, states that, "in 17 towns and villages ont of the 329 which he inspected, the first cholera case was said to have been imported from a previously infected locality." "There is strong reason to conclude," he states, "that, like the subtle poisons of small-pox and scarlet fever, cholera may be conveyed from place to place in the clothes or in the bodies of those who have been exposed to it;" but the general conclusions which he formed as the result of his enquiry do not seem to point to the belief that such human agency is the ordinary medium by which it is disseminated; for, immediately preceding the passage which I have just quoted, he writes—

Dr. Ince, who made a special enquiry into the epidemic in the Peshawur Valley, does not conclude that cholera was chiefly spread by human agency.

"As to the cause of cholera it is probably a specific poison allied in its nature and origin to that of malarious fever. It is not known how it is generated, but the influence of heat and light and moisture, the presence of organic matter in process of decacy, and specially the existence of some peculiar condition of the air, chemical, electrical or otherwise, are probably more or less essential to its production, and the nature of the soil, the proximity of sub-soil water, and the presence or absence of trees, may also have some influence on the process. When developed, it seems to pervade the air as an unseen smoke or vapour; but the usual results of moving troops and prisoners from their barracks would appear to indicate that its diffusion is limited, and it is also probable that it gravitates being most abundant in the lower strata of the atmosphere, or those nearest the surface of the ground. It also seems that it may be absorbed by water which, as is probably the case with marsh maism, may thus become the medium of its propagation."

And immediately afterwards he adds—

"Some believe that the poison has the power of multiplying itself in the human body like the other recognized zymotic poisons as those of measles and small-pox, and, therefore, that the disease may be communicated to others either by touching the patient, or by inhaling or imbibing the exhalations or excretions of his body. This opinion, however, is rendered doubtful by the rareness with which those attending cholera patients are affected; even in cases where they are attacked, it is equally probable that both patient and attendant were infected from a common source either by breathing the same vitiated air, or drinking the same contaminated water. * * * During the epidemic at Peshawur there was a more or less universal feeling of *malaise* amongst the residents. Although not exactly ill, most people felt that there was something wrong; this was probably due to the intensity of the cholera poison which was then pervading the air."

35. I have quoted these passages at length because the epidemic was very severe in the Peshawur Valley, and this was the only portion of the Punjab in which, so far as I am aware, any special investigation was instituted into the history of the disease. The facts which Dr. Ince has recorded, and the conclusions which he has drawn from them, do not favor the opinion that the cholera was spread by human agency. The first

The evidence throughout the Punjab generally does not favor the opinion that the disease was so spread.

statement appended to his special report shows that, out of 185 villages attacked, the date on which the first case appeared was in 126 of them between the 9th and 27th of September, the very time when the epidemic was most severe in the city and cantonment. The facts which have been recorded regarding the spread of cholera in the Punjab during 1869, certainly do not favor the idea that it was diffused by persons coming from infected localities. The disease was widely diffused throughout the Province, in all 9,258 deaths were registered as having been due to it. If 50 per cent. of recoveries be accepted as the ordinary result, it follows that nearly 20,000 persons must have been attacked. Many hundreds of villages must have suffered, and yet the evidence of importation may be said to be almost *nil*. The difficulties of obtaining accurate data regarding Native communities are doubtless very great, and, as Dr. DeRenzy remarks, "failure to establish an affirmative does not prove a negative." But any opinion which does not rest on a solid basis of well ascertained facts is no better than a theory, and it cannot certainly be affirmed with reference to the recorded history of cholera throughout the Punjab in 1869, that human agency was indispensable for its diffusion.

The influence of human intercourse in spreading cholera requires much further investigation.

36. I will not, I trust, be imagined that, in making these remarks, I am arguing against the views of those who believe that human agency is the only or the chief means of spreading cholera. My object, as I have already stated, is merely to sift the evidence, and see how far it bears out the opinions which have been advanced. I am quite prepared to accept any conclusions which may hereafter be satisfactorily proved, but this is one of those important questions which requires very careful investigation before any answer can yet be given to it. Is human agency the great medium by which cholera is diffused over India? This is the point which has to be determined, and it is to be settled not by any mere theoretical considerations or foregone conclusions, but by a patient and painstaking investigation into the facts of every epidemic as it comes under observation.

There is no evidence to show that the violence of the epidemic at Umritsur was due to the use of water tainted with cholera discharges.

37. The water theory, as originally propounded by Dr. Snow, has attracted much attention and found many supporters in England. In Dr. DeRenzy's opinion it explains all the phenomena of the epidemic of 1869 in the Punjab, and it is, therefore, of great importance to test how far this opinion is really borne out by the evidence. The only places in the Province which suffered with any great violence were, as has been already shown, Umritsur, Peshawur, and Kohat. Is there good reason to suppose that this violence was due to the fact that the water had been tainted with cholera discharges? The water at Umritsur is very impure, but there are no data regarding the great epidemic in that city which substantiate the opinion that impure water was *the* one of the many insanitary conditions under which the people live which governed the violence of the disease. We have the two facts,—an impure water-supply and a high death-rate from cholera; but there is no reason to suppose that the one was the only, or even the chief, cause of the other. There is no reason to believe that the water of Umritsur is more impure than that of Native cities generally. The wells at Lahore, for example, are by no means pure; on the contrary, the Sanitary Commissioner states that "they are, as a rule, much exposed to pollution," and yet in Lahore, although the disease appeared, the mortality which it is occasioned equalled only 2·48 per 1,000, whereas at Umritsur it was 22·71, or nearly ten times as great. If the inhabitants of one particular quarter of the town of Umritsur or those using any particular water-supply—and it is worthy of notice that there are no less than 1,025 wells within the city—had suffered first or most severely, there would be some ground for believing that the impurity of the one caused the epidemic violence of the other. But this is the very reverse of what occurred. The first authentic case was observed on the 27th May. "After the 27th May," writes the Sanitary Commissioner, "cases were of almost daily occurrence at Umritsur, but they were not numerous in any one place. * * *

* * * * * *

The disease was confined to no particular quarter, but isolated cases occurred in all directions. * * From the 1st August the disease was universally diffused." But even if it be admitted that the violence of the outbreak at Umritsur was due to the impurity of the wells, it by no means follows that the result was caused by the presence in this water of any special virus derived from cholera evacuations.

The accuracy of the facts connected with the outbreak of cholera among the lunatics in the Lahore Asylum, as recorded by the Sanitary Commissioner, has been called in question.

38. Before considering the water theory in its application to Peshawur, some notice may be taken out of the outbreak in the Lunatic Asylum at Lahore. Dr. DeRenzy explains it occurrence on the supposition that the sand which had been used for filtering the water drunk by the lunatics had been taken from a hole a few hundred yards from the Asylum in which he found human and other excrement. "According to the standing rules of the Asylum," he says, "the filtering sand is changed every Saturday. According to rule the sand would have been changed on Saturday, the 4th September. There is a strong probability that the sand taken from the hole already mentioned was that used on this occasion. The epidemic exploded next day at 4 P. M."

Now, even if this statement be admitted as absolutely correct, it still falls very far short of proving that the outbreak was due to the use of water containing cholera discharges; but as a matter of fact the whole circumstances were carefully investigated by the Civil Surgeon and the visitors of the institution, and the conclusion at which they arrived was to the effect that the sand used for filtering on the day in question had not been taken from this hole, that, on the contrary, it was part of the very same supply which had been used for some time previous without any ill effects and which continued to be used after the outbreak ceased. In their opinion there was no reason to suspect that the locality from which this sand had been taken had been defiled, nor was there any ground for concluding that the use of this sand has been in the smallest degree connected with the severe outbreak of cholera among the lunatics. I have no intention of judging which is the correct version of the story, but the objections which were made both by the Civil Surgeon and the visitors to Dr. DeRenzy's statement of the facts of the case ought to have been mentioned. It is of the utmost importance that every assertion on a matter of fact should be thoroughly tested before it is accepted as correct, and that any doubts which have been expressed, especially when they come from such competent authority as they did in this instance, should be recorded.

The facts of the Peshawur epidemic do not countenance the water theory.

30. The circumstances connected with the outbreak at Peshawur have been already fully discussed in my Annual Report for 1869, and no few facts have been recorded by Dr. DeRenzy which induced me in any degree to alter the opinions which are there expressed. The main water-supply of the city and cantonment, flowing as it does in an open channel, is peculiarly liable to pollution. Here, again, as in the case of Umritsur, we have an impure water associated with a severe outburst of cholera; but there is no evidence to shew that they stood in the relation of cause and effect. Indeed, there are certain facts which favor the opposite conclusion. The main water-supply, as I have just stated, is the small stream which runs through the cantonment, and which is very liable to defilement, but the water from Mackeson's well is of good quality, and from this was obtained what was required both for the Royal Artillery and the 104th Regiment. The 36th Regiment drank of the stream water, and yet they did not suffer more than the wing of the 104th which remained in the cantonment, after the other wing left, and drank of the well water. Dr. DeRenzy attempts to meet this difficulty by saying that the troops who were supposed to be supplied from the well may really have obtained their water from the stream, for the water-carriers must naturally prefer to fill their *mussucks* in the easiest manner possible. When at Peshawur I made special enquiries on this point, and was assured on the best authority that the supply both for the artillery and the 104th was very carefully taken from Mackeson's well. The water theory altogether fails to account for the facts—the escape of the left wing of the 104th Regiment which marched from the cantonment soon after the disease commenced, the continued suffering of the 36th Regiment long after it had ceased to draw its water from the cantonment, cutting the extreme violence of the disease among the different bodies of troops whether in the cantonment or in camps, among the Native population of the cantonment and the city, and also I believe throughout the Peshawur Valley generally on one and the same day—the 19th September. The immunity of the small garrison of the fort, Dr. DeRenzy attributes to the better quality of the water of the well from which their supply was drawn, and yet the water of this well is certainly no purer and no better defended than the water of the wells at many stations of which the troops drank, and yet suffered severely.

Nor do those at Kohat, but the details are imperfect.

40. The facts regarding the epidemic at Kohat are very much of the same character. Here the water-supply runs in an open stream, and is very liable to pollution, and here also the people, both of the city and cantonment, suffered much. The record of the outbreak is imperfect. In discussing the circumstances connected with it in my annual report, I was obliged to content myself with a short general statement which was supplied to me by Dr. Kelly, the Medical Officer of the 1st Cavalry. Without a full account of the several movements of the troops, and of the water-supply with which they were provided at their different encampments, it would be impossible to discuss the facts of this outbreak which bear on the water theory with any degree of satisfaction. But here, again, even if it be admitted that the use of impure water was the main agent in spreading the disease, it still remains to be proved that this water acted in virtue of any cholera discharges which it contained.

At Peshawur different communities drawing their water from different sources all suffered severely.

41. The experience of London in the matter of cholera epidemics which Dr. DeRenzy quotes as demonstrating the truth of the water theory is chiefly valuable, because it showed that, in certain communities living with one exception under the same conditions, the violence of the disease appeared to be regulated by the quality of the water-supply—the one condition which they differed. But no evidence of this nature has been adduced in India. There are innumerable instances of towns and cantonments suffering severely from cholera, of particular bodies of troops being attacked while all the others escaped, but no evidence has ever been adduced to connect the attack or the

escape with the use of any particular water. Those who suffered, and those who escaped frequently drew their supply from one and the same source. And the facts at Peshawur do not tally with the experience of London. The London experiment has, indeed, been repeated at Peshawur with a very different result. Here, also, we have different sections of the community living under similar conditions in every respect, except the source from which they drew their water-supply, but there has been little difference in the extent to which they have suffered from cholera. It may be urged that, although the sources may have varied, they all agreed in being more or less impure; but even if this be admitted, it can hardly be conceived as possible that all of them should have been contaminated with cholera discharges, and that in such a way as to cause the greatest number of attacks in each of the communities who used them on or about one and the same day.

The geographical distribution of cholera cannot be explained on the water theory.

42. Nor can the geographical distribution of cholera in India be explained on the water theory. The water-supply of the people throughout the Punjab and the greater part of the North-Western Provinces is very much of the same character: it is drawn from wells which are all liable to pollution in very much the same way and to the same extent; and yet between Umritsur and Peshawur, a distance of several hundred miles, although cases were recorded from many of the Districts between the month of May, when the first case appeared in Umritsur, and the month of September, when the outbreak commenced at Peshawur, with the exception of the case of the Lunatic Asylum at Lahore, we have no history of any special violence in any particular locality. In the North-Western Provinces, on the other hand, we have large tracts of country where the people suffered most severely. Is it conceivable that in the one case it so happened that all the wells over a large area escaped the cholera pollution, while those in the other area were generally so contaminated? Again, is it reasonable to imagine that in one year the water over one area is polluted with cholera discharges, while in another year the pollution falls on a different portion of the country?

The general facts of the epidemic in the Punjab do not support the water theory.

43. On a careful examination of all the facts, I cannot, therefore, admit that there is any evidence to prove that cholera-tainted water was the most influential of all the conditions which favored the propagation of cholera in the Punjab in 1869. Much more precise and positive proof must be adduced before the doctrine can be accepted as a truth. That good, pure water is one of the next important requisites for health I fully admit, and, as I have frequently urged, there is no more pressing reform required in cantonments, cities and villages than the provision of a really good water in ample quantity of the best quality and defended in every way from impurities, but the value of this reform can be insisted on just as forcibly and, indeed, with even greater justice, without attaching to it a theory which, so far as the facts regarding cholera in India are concerned, as yet rests on no basis whatever. Facts may hereafter be adduced to show that this water theory is more or less true, but, until such evidence is produced, the assertion that cholera is propagated mainly by cholera-tainted water remains unproved. This is one of the great questions to be investigated by the Sanitary Commissioners with the utmost care and attention, but such an investigation can never be conducted with the hope of any satisfactory results, if it be assumed at the outset that certain theories regarding the disease have already been established as facts, that cholera cannot be diffused except by human agency; that cholera evacuations contain the special virus by which disease is spread, and that this virus acts on any community by gaining access to the water-supply. If the truth of these statements is believed by the enquirer to have been already demonstrated, very little remains for him to learn. But if, on the other hand, he enters on the study of an epidemic with his mind altogether unbiased, he will find, difficulties and anomalies innumerable, which require the most patient and painstaking investigation.

The reasons which Dr. DeRenzy assigns for devoting a large part of the cholera section of his report to reviewing Dr. Bryden's work are based on a misapprehension.

44. Before leaving this section of Dr. DeRenzy's report, I must shortly advert to that large portion of it which is devoted to a review of Dr. Bryden's work on cholera. I have no intention of entering into this discussion, but the reasons which Dr. DeRenzy assigns as rendering it necessary for him to examine Dr. Bryden's views are founded entirely on a misapprehension, and, therefore, require some notice. "It is necessary for me," he writes, "to examine the propositions which express Dr. Bryden's theory in some detail, because (1) this officer's forecasts of the probable distribution of cholera and his views of its mode of dissemination have become the recognized basis of the action of the Government of India against cholera; (2) because the principles he maintains are diametrically opposed to those on which in my report for 1868 I urged the Punjab Government to proceed; and (3) because I consider his theory erroneous and seriously calculated to retard sanitary progress." The first of these three statements is altogether incorrect and without the smallest foundation of fact. The action of the Government of India in regard to cholera has never, in the slightest degree, been influenced by any theoretical considerations whatever. In June 1869, the special occasion to which I presume Dr. DeRenzy refers when cholera threathened to be general over Upper India, I recommended that, if the

disease should appear at certain stations which had suffered severely in former years, the troops should be at once removed to places which had hitherto enjoyed a remarkable immunity from cholera, and arrangements were made to carry this suggestion into effect. Happily it was not required in the case of the stations selected, but the recommendation rested on no theory but simply on the experience of a series of years. The rules to be observed on the appearance of cholera among European troops have been framed so that no precaution may be omitted which there is the smallest reason to believe may be adopted with advantage. They enunciate no theories, and yet the procedure they prescribe might have been recommended by the most enthusiastic believer in human intercourse and the water theory.

So is his statement that Dr. Bryden's views are calculated to retard sanitary progress.

45. With Dr. DeRenzy's second reason I have no concern, nor with the first portion of his third reason; but when he states that Dr. Bryden's theory is "calculated seriously to retard sanitary progress," he falls into a grave error. The progress of cholera over a given area, according to Dr. Bryden, is to a certain extent inevitable; but the degree in which the inhabitants of that area are likely to escape will depend greatly in their sanitary condition, on the purity of the water-supply, the excellence of the drainage, and the completeness of all other such arrangements. Dr. Bryden's object was not to write a work on sanitation, but to explain what he believes to be the laws which govern the spread of epidemic cholera over the country. The benefits of sanitary improvements were not insisted on, simply because this was not the point under discussion. But if Dr. Bryden's views should be substantiated, they will enforce the necessity of great sanitary improvements as the main means of escape, perhaps more strongly than any others which could be advocated; and such reforms would embrace not only the one item of a good water-supply, but every other requisite for health.

Such criticisms are calculated to do much harm by converting the Sanitary Commissioners into partisans of some particular theory in place of being, as they should be, earnest and unbiased observers of facts.

46. Dr. DeRenzy does but scant justice to Dr. Bryden's remarkable work, and it appears to me that, if such a proceeding as he has adopted is to be generally followed, it will lead to very inconvenient results. In any department it would be highly undesirable that one officer should dilate on and endeavour to expose what in his opinion are the fallacious doctrines of another, but in the investigation of such a difficult question as the causation of disease, and especially the causation of cholera, where our knowledge is as yet so far from exact, this course is especially to be deprecated. If the Sanitary Commissioners are to be engaged in reviewing each others reports, much of the benefit expected from their appointment will certainly be lost, and there is every reason to fear that what ought to be an altogether impartial investigation into facts will rapidly degenerate into controversy. In order that a Sanitary Commissioner may properly discharge the important duties assigned to him, it is of the first importance that he should keep his mind perfectly unbiased by all theories. His great aim should be to collect facts, and *from these facts*, by a process of strictly logical induction, to draw what conclusions may be warranted by them, his judgment being altogether unfettered by the opinions which have been expressed even by the highest authorities. India presents a field for the study of cholera and other diseases such as can be found nowhere else, and the evidence which is year by year available in each Province, if carefully collected, affords ample field for study. If a Sanitary Commissioner is to become the advocate of any particular theories, and the opponent of every other Sanitary Commissioner who differs from him, it is quite impossible that he can preserve that thoroughly unbiased and unprejudiced frame of mind which is so essential for the successful discharge of his duties; he will see only the facts which suit his own peculiar views, and insensibly shut his eyes to those which tell against them. Full and free discussion on sanitary matters is of great value, but this can be perfectly secured without introducing any element of controversy; and I would, therefore, strongly recommend that the Sanitary Commissioners should refrain from criticising the views which may be held by other officers in the same department.

The conclusions of the Sanitary Commissioner of Oudh are chiefly negative.

47. The Sanitary Commissioner of Oudh is of opinion that the history of the epidemic in that Province has shed no light either on the nature, the origin, or the mode of the propagation of cholera. He is still inclined to the opinion that "there are two entirely distinct diseases known under the same name one of which is of a spreading nature, and the other is not," but this is one of those general statements which, in the absence of all proof, is of very little value. Dr. Sutherland states that "there has been no evidence of contaminated water being the means of conveyance of the disease, or of its germinating in the soil."

In the Central Provinces Dr. Townsend believes that cholera was spread solely by human agency.

48. The most important conclusions at which Dr. Townsend has arrived regarding the epidemic in the Central Provinces may be learned from the following passages of his report: "It is scarcely too much to say that the cholera which spread over the whole of the Central Provinces and the Bombay Presidency, and reached south-

ward as far as Hyderabad in 1868-69, is traceable primarily to the cities of Mirzapore and Benares on the Ganges, and secondarily to the gangs of coolies on the road between Jubbulpore and Nagpore, and that human intercourse was the sole agent by which the spread of the disease was effected. The current in the main artery of communication between Eastern and Western India became polluted, and every region supplied by its ramifications became affected more or less according to its susceptibility. * * * * * * Every District in which enquiries were instituted furnishes evidence of importation by means of human intercourse, and in this as in my last report instances are everywhere given of the effect of fairs and other gatherings of people, and of the communication of the disease from village to village and from person to person." * * *

"Taking the facts that I have collected in this report and that of last year, I think it must be conceded that cholera spreads by the agency of human intercourse, and that it requires no other medium for its diffusion ; that in other words it may fitly be placed in the category of contagious epidemic disease."

* * * * * *

"In this report and in that for 1868 frequent instances have been given in which cholera was conveyed from one locality to another by persons not suffering from the disease, and there can be little doubt that during an epidemic this constantly happens."

49. These extracts show that Dr. Townsend is a firm believer in human agency as the great if not the only means concerned in the diffusion of cholera; and it must be admitted that, in his very careful enquiry, a very large number of instances are adduced in which the disease appears to have been communicated by persons eitheir suffering themselves or coming from an infected locality. The general history of the epidemic, as described by Dr. Townsend in the following passage, does not, however, favor the idea that human intercourse was even the main medium by which the disease was spread. "It may be said generally," he writes, "that the epidemic of 1869 had become diffused over the Province by the enti of March and beginning of April ; that its prevalence increased rapidly in May and reached its maximum early in June before the rains set in and then declined ; from the beginning of July the decline was rapid, and continued with a slight interruption in the first part of August till October, when the epidemic finanally died out. This description of the rise and decline of the epidemic over the whole Province applies to the greater number of the different Districts. These were, however, exceptions." That there was some general influence at work which produced these results, and which governed the rise and fall of the epidemic over a large area, cannot be doubted; but whether it was a miasm in the air or some other cause, regarding the nature of which we are as yet profoundly ignorant, has still to be determined.

Many instances have been given by him which appear to favor this view, but it is not supported by the general history of the epidemic.

50. Dr. Townsend is of opinion that this one general influence is the condition of the water-supply, not the water theory in the same sense in which it was advanced by Dr. Snow and advocated by Dr. DeRenzy, but simply that the rise and fall of the disease are intimately associated with the impurity or purity of the water drank by the inhabitants. His remarks on this point are very interesting and well worthy of attention ;

Dr. Townsend believes that the one general influence which governed this history was the condition of the water-supply.

"671. In the report on cholera that I submitted last year I adduced a number of facts showing the intimate connection between impure water and the prevalence of cholera among the Native population, and the evidence of this report of which the above diagram may be considered an epitome, particularly if read in connection with Table 14, showing the rise and fall of the water in the wells in different parts of the Province, abundantly confirms the conclusion there drawn that drinking water fouled with organic impurities is the chief, if not the sole, condition under which cholera becomes epidemic in these Provinces.

"672. The descriptions that have been given in the foregoing pages of the water-supply of the different Districts confirmed as they are by the drainage statistics given in Tables 13* and 14† show that from the time that the rains cease in September till the rains of the next season commence, the water-supply of the country is continually diminishing and deteriorating; as the hot weather approaches, the current in the larger rivers slackens, and in the smaller streams ceases altogether, tanks more or less dry up, the water in the wells runs low in the second or third week of April, the hot and dry North-Westerly winds set in, evaporation becomes exceedingly rapid, the diminution of the water-supply is greatly accelerated, and the insects and animalculæ that swarm in all sources of water-supply die and putrify. The extent to which this death of animal life in water takes place will, of course, depend on the volume of water and the conditions of stagnation and exposure to the action of sun and evaporation ; but I believe it may safely be said that annually, in the hot weather between March and

* Flow of water in Kanhan.

† Rise and fall of water in wells.

June, a very large proportion of the drinking water of the people of this Province passes through a state of putrefaction. It is at this time that cholera is most rife, and it creates the greatest havoc in those Districts in which water is most scanty and most exposed to the action of the sun and of evaporation, in Chattisgarh and Mundla, where the water-supply is derived from tanks or from stagnant nálás.

"673. Towards the end of May, the South-Westerly winds and gathering clouds, which indicate the approach of the monsoon season, check the deterioration of the water-supply; cholera begins to decline, and, with the first showers of the rainy season, there is a considerable fall in its provalence; but with the heavier rains, another cause, by which the water-supply is rendered impure with animal matter, comes into play, and the tanks and wells become fouled by surface drainage. The operation of this cause is first evident in the District of Biláspúr, where, as I have shown, the tanks are most liable to pollution by surface drainage from the villages; a little later, when the rains have continued for some weeks, the surface water reaches the wells, and we find the prevalence of cholera increasing in the Districts of Nágpúr plain, where the water-supply is largely derived from wells sunk in porous strata, and in which the rise of the water is most rapid; but even here the operation of this cause is most marked in the towns wihch have a wide area of polluted soil, and few villages are affected by it. The general decline of cholera throughout the country, though impeded by this cause, still continues, and eventually, when the sources of water-supply have been everywhere replenished and the rains cease, cholera dies out. * * *

"680. All these facts tend to show an intimate connection between cholera and water contaminated with animal organic matter. They do not, however, support the view that the water, under the use of which cholera is produced, is contaminated with the excreta of persons suffering from the disease; that it is simply the medium by which a specific poison contained in choleraic excreta is conveyed into the system That choleraic dejections may contain specific poison, is quite possible; but that the diffusion of the disease over a wide area depends upon this poison being communicated through the medium of the drinking water, is most improbable. The evidence of the epidemic of 1869 in these Provinces is totally opposed to this view; for the diffusion of cholera by this means sufficient rain-fall to wash surface impurities into the water is presupposed; but in these Provinces, a full of rain in the hot weather that yields any surface drainage is a comparatively rare occurrence; and a reference to Table 12, which gives the rain-fall of the Province in 1869, will show that during April and May, when the epidemic spread with the greatest violence, the mean rain-fall over the whole Province did not exceed half an inch; and it is rather remarkable, too, that in the Districts of Nimar, Chindwará, Chándá, and Sironchá, where the rain-fall in May was rather above the average, cholera was least prevalent.

"681. While, therefore, I by no means deny the probability that the dejections of cholera patients contain the specific virus of cholera, I believe the instances in which the disease is communicated by water contaminated with this form of pollution to be comparatively rare. The connection between cholera and impure water is most commonly that of a predisposing cause, and there is reason to believe that any form of decomposing animal matter will create this predisposition; that water polluted by dead bodies thrown into it or buried near it, by the death of the animalculæ, or fish that swarm in nearly all sources of supply, or by the excrement of men or cattle conveyed into it by surface drainage, or percolation through a porous soil, will act as a virulent and fatal poison when the infection of cholera is present.

"682. I have given evidence, both in my last report and in this, that the inhabitants of a town or village may use water impregnated in an excessive degree with animal organic matter with apparent impunity as long as they are not exposed to the infection of cholera; but when this happens, when an infected individual arrives among them, the disease is manifested with violence in proportion to the degree of pollution of the water-supply."

If this view be correct, then cholera should be epidemic every year.

51. Much, no doubt, depends on the water-supply; but if the circumstances described by Dr. Townsend are those which govern the rise and fall of cholera, or, if, to use his own words, "drinking water, fouled with organic impurities, is the chief, if not the sole, condition under which cholera becomes epidemic in these Provinces," it is difficult to understand why it is not epidemic in every year.

Dr. Townsend believes that this is prevented by all those who are susceptible having been already carried off.

52. In a succeeding paragraph Dr. Townsend, as if anticipating such an objection, propounds the theory that "the disappearance of cholera is due primarily not to the dying out of the choleraic influence or contagion, but to the absence of individuals susceptible to its effects," and that "a tract of country over which cholera has spread is for a time protected from a recurrence of the disease." But how is such a theory to be reconciled with the persistence of cholera within its endemic area, or how are the oftrecurring epidemics, which break out in Districts bordering on this endemic area, to be explained? The question, although of theoretical interest, is of no practical importance, except in so far as it is connected with Dr. Townsend's opinions in relation to the impurity of the water being "the

chief, if not the sole, condition under which cholera becomes epidemic." Without much further evidence, the theory could not be accepted. It is difficult to believe that when more than 100,000 persons, double the number who died of cholera in the Central Provinces in 1869, were found susceptible to the disease, in one year, only 240, double the number who died in 1870, should be found susceptible in the year following, out of a population of over 6,000,000. Moreover, there is certainly no evidence to show that one attack of cholera confers any immunity from subsequent attacks; on the contrary, there is some reason to believe that those who once suffer are rather more liable to the disease than they were previously. But without insisting on this latter point, there remained 50,000 persons in the Central Provinces in 1870 who had recovered in 1869; there is no reason to doubt that they were susceptible to the disease, and yet in the whole Province only 120 persons died of cholera in 1870.

In the history of the epidemic in the Central Provinces, there are several striking facts which support Dr. Bryden's views.

53. Dr. Townsend also has criticized Dr. Bryden's views in relation to the facts of the epidemic as it affected the Central Provinces. I have no intention of attempting to defend these views. At another time, with further experience, Dr. Bryden will, no doubt, be able to explain them still more fully, and to adduce fresh illustrations of the general truths which they contain; but I would observe that there are some points in Dr. Townsend's remarks which deserve notice. In the first place, it is to be noted that, according to Dr. Bryden, the cholera of the Central Provinces in 1869 was not a new invasion, but a reproduction of the cholera of the previous year, and that, therefore, the meteorology, so far as regards the prevailing winds, does not affect the question. If the meteorology of 1868, the year in which the invasion took place, be considered, it may be argued that here also the prevailing winds did not favor the entrance of any miasm from the endemic Province of the disease, but too much stress appears to have been laid on the question of the comparative prevalence of different winds. If cholera is an air-borne miasm, which is sown broadcast over a large area by means of wind, it is quite conceivable that it should be so sown with great rapidity.

It is to be remarked, moreover, that the wind which Dr. Bryden believes to have been the vehicle by means of which the Central Provinces were invaded by cholera in the spring of 1868 was a North-East wind—a wind, in fact, which would follow very much the same track as the highway from Mirzapore and Benares, along which, according to Dr. Townsend's belief, the disease was imported by human beings. A reference to page 154 of Dr. Bryden's general report, and especially to the foot note on that page, shows that such North-Easterly influences prevailed to an unusual degree at the time in question, and this phenomenon is easily accounted for by the signal failure of the South-West monsoon which characterized the year. I am not arguing in favor of the air-borne theory, but it is certainly not disproved by the fact that the winds in 1869 were not *generally* such as would bear up a misam from the delta of the Ganges. Dr. Townsend's remarks on the extreme dryness of the atmosphere, which characterized the season when cholera prevailed in the Central Provinces, is a much more important point; but I must leave Dr. Bryden to consider the facts adduced by Dr. Townsend in connection with the views which he has advanced on the condition of the atmosphere most favorable to the spread of cholera. I would observe, however, that in Dr. Bryden's report on the cholera of 1869, he shows that the meteorology of the Central Provinces between the 9th and 15th May—the week in which the disease appears to have extended to the Districts which had escaped in 1868—was characterized by the general diffusion of moisture as indicated either by actual rain or the presence of clouds.

It is also very remarkable that, during the severe epidemic at Raipore—the only place in regard to which the daily register of the weather is given in full—clouds were frequent, and there were also occasional showers. In commenting on the Table which shows the "meteorological conditions at Raipore during the epidemic," Dr. Townsend remarks (paragraph 513)—"It will be observed that the period of the epidemic was characterized by great heat and dryness of atmosphere; that during the week in which it reached its maximum, storms of wind from the South with electric disturbances and a few drops of rain were frequent. With the exception of the slight shower registered on the 21st May, and the few drops of rain that accompanied the electric disturbances in the following week, there had been no fall of rain since the middle of March, and none occurred till the 22nd of June. By that time the epidemic had ceased in the town, and was on the decline in the District." I observe, however, that, from the 10th of May, the date on which the register commences, up to the end of the month, although the mean humidity denotes great dryness of atmosphere, clouds were very frequent. In 18 out of these 22 days their presence is noted in a greater or lesser degree, and the same remark applies to 14 out of the first 21 days of June.

The mode of enquiry adopted by Dr. Townsend is the best adapted for the purpose.

54. The sanitary report of the Central Provinces for 1869 is of much value, and opens up an almost endless field for discussion and attentive consideration in regard to cholera. The great questions connected with the disease still remain to be solved, but no better means could be adopted for accomplishing this important end than the special personal

enquiry which Dr. Townsend instituted, and the record of which is contained in his report. He has also suggested that a still more searching investigation should be undertaken in certain selected portions of the Central Provinces, where, with the aid of a medical officer and of Native Doctors, the whole facts within a limited area may be examined and accurately recorded. This investigation has been proposed as a contribution towards the special enquiry recommended by the Army Sanitary Commissioner in the 5th section of their instructions for conducting a cholera enquiry in India, and it will, I trust, soon be in operation.

The epidemic in Berar was supposed to be due to the use of pit-stored grain.

55. The epidemic of cholera in Berar is chiefly interesting from the fact that its violence was attributed to the use of old grain which, having been stored in pits for many years, was required under the pressure induced by the scanty crops of 1869. But a more careful investigation showed that this theory, which had been advanced by the Superintendent of the Revenue Survey, was incorrect. Although the pits in use in certain parts of the Province had been drawn on to a large extent, the grain was not required for local consumption, and had been exported to other Provinces where the demand was great. It moreover appeared that in those parts of Berar where such pits exist, cholera had not been so prevalent as in others where they are not used, and, as a matter of fact, the particular part of the country regarding which the theory had been advanced suffered less than any other portion of the Province. The pit-grain certainly could not be regarded as wholesome food, and was apparently well calculated to favor disease, especially of the digestive organs; but Dr. Lewis, to whom specimens were forwarded for examination, reported that, beyond having lost great part of its nutritive value, it did not present any peculiar features, nor did it develop any special organisms such as might be associated with the occurrence of an epidemic.

Notwithstanding different theories, there is a general consent as to the value of sanitary improvements as the best preservative against cholera.

56. The discussion of the cholera of 1869, and of the various opinions which have been advanced by the several Sanitary Commissioners with regard to it, has occupied much space; but the epidemic was a most important feature in the sanitary history of a very unhealthy year, and it is of the greatest importance that all the facts connected with it should be carefully examined. It will be observed that I do not consider any of the opinions adopted by the Sanitary Commissioners as proved; some of them are purely theoretical, others require patient investigation and further proof; but it is satisfactory to know that these theoretical considerations do not materially affect the practical measures which seem best adapted to arrest the violence of any future epidemic. The strongest supporters of the doctrine that cholera is spread by human agency, or by human agency alone, such as Dr. DeRenzy and Dr. Townsend, fully admit the impossibility of adopting quarantine. All are persuaded of the value of a pure water-supply, and the argument in favor of this essential requisite of health is in no degree strengthened, indeed it is rather weakened, by the theoretical assumption that cholera will attack any community with violence only when that water contains cholera discharges. The practical lesson of the epidemic is the same as that which has been taught by all former epidemics, general sanitary improvement or, as Dr. Planck has well stated it, "the improved sanitation of the Province generally, and especially of the principal centres of population."

57. Cholera was not the only disease which was more than usually prevalent in 1869. Small-pox and fever, to all appearance the ordinary malarious fever of India, attained a very remarkable ascendancy and caused great mortality. With regard to each of these very wide-spread epidemics, I shall endeavour to summarize all the information that can be collected from the reports of the different Provinces, but must premise that the history of both diseases is much less complete than it ought to be. Of the general distribution of small-pox over the Lower Provinces nothing is known. It does not appear whether the disease was more or less prevalent than usual. At Dacca there was an outbreak which began to prevail in September 1869 and lasted, it is reported, till the month of April 1870. The case is interesting chiefly on account of the special measures which were adopted to check the disease. Extra vaccinators were employed, a special small-pox hospital was established, and every precaution taken to arrest its spread. The great extension of the disease which was to be feared in the spring did not take place.

SECTION II.

B.—*Small-pox.*

Its distribution and relative prevalence in the Lower Provinces are not recorded.

Outbreak at Dacca checked by special measures.

In the North-Western Provinces small-pox was more prevalent and fatal than cholera.

58. How widely small-pox was spread in the North-Western Provinces during 1869, and what a fertile source of mortality it was, may be judged of by the fact that while 69,542 deaths were registered from the great cholera epidemic of that year, the deaths attributed to small-pox numbered no less than 90,770. These figures are doubtless far from accurate. Deaths arising from measles and any other diseases associated with an eruption on the skin, are apt to be included by the people under the one general head of small-pox; but against this source of error, which is calculated to increase the

number, it must be remembered, on the other hand, that very many deaths as yet escape registration altogether, and the probability is that the mortality from small-pox has been rather under-stated than placed at too high a figure.

The escape of Kumaon and Gurhwal, where vaccination had been general, bears striking testimony to the protective power of vaccination.

59. The information regarding this great epidemic is unfortunately very scanty. During the first five months of the year the disease was epidemic in many of the Districts and prevalent in almost all. The fact that Kumaon and Gurhwal, with a population of nearly 650,000, escaped with only nine deaths, while in other Districts the victims were numbered by thousands, is a striking testimony to the protective power of vaccination and to the able exertions of Dr. Pearson who laboured so many years and with so much success to protect the people in these hilly tracts of country.

The monthly rise and fall of small-pox are illustrated by the statistics in a few Districts.

60. The deaths from small-pox are not shown according to months except for four Districts, but these statistics well illustrate the seasonal prevalence of the disease—the gradual rise from January to April, and then the gradual decline:

1869.	Deaths from Small-pox.			
Month.	Allygurh.	Agra.	Cawnpore.	Banda.
January	840	1,342	331	787
February	981	1,212	471	1,265
March	1,337	1,456	1,088	2,056
April	1,285	1,834	1,615	1,798
May	1,218	1,183	1,718	827
June	478	442	723	239
July	175	132	243	57
August	59	117	83	8
September	21	52	25	5
October	18	12	18	3
November	14	12	6	...
December	23	8	6	1
Total ...	6,449	7,802	6,327	7,046

Dr. Planck's idea that the annual increase of small-pox every cold weather is due to the general practice of inoculation at that season, is not consistent with the facts.

61. This rise and fall of small-pox, which is not confined to the North-Western Provinces, to any one section of the community, or to any particular year, is one of the most remarkable and unaccountable features of the disease which is of great interest, and the cause of which requires very careful investigation. Dr. Planck's theory on the subject is altogether unsupported by facts. "I am inclined to think," he writes, "the reason why deaths from small-pox always commence and increase in the cold weather months is that inoculation is practised then, and so the contagion of the disease is spread in every centre of population to end by becoming epidemic in some years in the months." It is a known fact that wherever inoculation is practised, there is a certain amount of risk of spreading the disease; but the opinion that the increase of small-pox over a whole Province at a particular season of the year is really due to inoculation, would require some proof before it could be accepted as correct. Different Districts must be compared,—those in which inoculation is the practice and those where it is not known, and the results examined. As a matter of fact I find from a summary of very interesting information on the subject of inoculation in different parts of India, which was issued by the Medical Department in its "general report No. 2 on the Lunatic Asylums, Vaccination and Dispensaries in the Bengal Presidency for 1869, compiled by Surgeon-Major Ross, Secretary to the Inspector General of Hospitals, Indian Medical Department," in 1870, that, in the North-Western Provinces, inoculation is the exception and not the rule. It would appear to be confined to the Benares Circle and the Jounpore District. Throughout

the Provinces generally it is unknown. In the four Districts, for example, which Dr. Planck has cited in illustration of the rise and fall of the disease, no inoculation would appear to have been carried on, and, as he remarks, "a like table of all the Districts would give the same general result," those few in which inoculation is resorted to obeying the same law as those in which it is not adopted.

The details of the small-pox epidemic in the Punjab are to be gathered from the tables appended to the report.

62. Although Section 2 of Dr. DeRenzy's report is devoted to "the history of the epidemics of the year," the only two diseases of which it treats are cholera and fever. Small-pox is not alluded to and yet 53,195 deaths from small-pox were registered, or nearly six times the mortality from cholera. The Districts in which it chiefly prevailed, and the monthly prevalence of the disease are, however, clearly shown in Returns A. and B. of the Appendix attached to the Report. In the District of Montgomery the highest death-rate from small-pox, 11·79 per 1,000, occurred. In Gurgaon it was 10·34. In six other Districts the rates were over 5 per 1,000. In the Province generally it was 3·05. The comparative prevalence in different months is shown in the annexed statement.

Monthly deaths from small-pox in the Punjab in 1869.

January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
6,307	6,382	7,169	6,946	10,609	6,768	3,217	1,835	978	582	836	1,566	53,195

The deaths from small-pox in Oudh are not shown by months.

63. In Oudh 21,564 deaths were ascribed to small-pox, or very nearly as many as were attributed to cholera. The death-rate under this head varied from the 8·9 in Oonao to 0·1 in Kheree. For the Province generally it was 1·9. No details are given showing the distribution by months.

In the great epidemic of the Central Provinces the decline commenced a month earlier than in the Punjab.

64. The Central Provinces also suffered severely from small-pox, and the statistics for 1869 show a very remarkable increase in the mortality from this disease. In 1867, and again 1868, the deaths registered under this head were about 3,000. In 1869 they were nearly 17,000. The mortality by months was as follows, and it will be observed that, although the decline commenced a month earlier, the disease obeyed the same general law as that which was followed in the other Provinces:

Monthly Deaths from Cholera in the Central Provinces in 1869.

January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
644	1,073	2,601	4,648	3,849	1,091	932	461	239	141	114	156	16,849

These statistics are valuable so far as they go, but, as Dr. Townsend remarks, the amount of mortality from small-pox does not afford a very accurate test of the relative prevalence of the disease in different Districts, for the fatality varies greatly. From certain selected returns it appears that the proportion of deaths to cases varied in five Districts from 4·8 to 20·8 per cent. Dr. Townsend is inclined to believe that, in the Central Provinces, the course of an epidemic of small-pox is, to a great extent, parallel with that of an epidemic of cholera, and that a water-supply impregnated with animal matter which, in his opinion, regulates the violence of cholera, aggravates the effects of the contagion of small-pox, and renders it more deadly in its operation. That the diseases may rage together I have no doubt, but the mere fact cannot be taken as proof that the cause of cholera is a specific poison which passes from man to man.

65. Berar also suffered much from small-pox: 6,365 deaths from it were registered, or 3·0 per 1,000 of the population. The number in each month is shown in the annexed statement.

The epidemic was also severe in Berar.

Statement showing the Monthly Deaths from Small-pox in Berar in 1869.

January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
2,769			1,434	1,012	497	269	193	69	28	37	55	6,365

66. In the Madras Presidency small-pox caused a heavy mortality, but the deaths, nearly 18,000, were not so numerous as in 1868, when they numbered 34,330. The monthly mortality from the disease is shown in the annexed statement.

In the Madras Presidency small-pox was not so fatal as in either of the previous years.

Statement shewing the Monthly Deaths from Small-pox in the Madras Presidency during 1869.

January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
1,956	1,661	2,123	1,943	1,894	1,609	1,565	1,358	1,009	896	760	977	17,751

67. The deaths registered as having been due to small-pox in the Bombay Presidency during 1869 were 12,673. The details are not given by months, but it is noted that by far the greater number occurred during the first-half of the year, the proportion during the first six months having been nearly as 5 to 1 compared with those in the other six. The greatest number (2,239) were reported in April, but in March they fell only 200 short of this figure.

The deaths from small-pox in the Bombay Presidency are not detailed by months.

68. Fever is the only other disease of which special mention need be made in reviewing the vital statistics of the year, and, great as was the mortality from cholera and small-pox, the mortality from this cause was much greater still. The deaths recorded under this head are less accurate even than those under the other heads; for the uneducated are quite unable to distinguish with any accuracy the cases which should be recorded under it, but there can be no doubt that the year 1869 was characterized by one of the most wide-spread and fatal outbreaks of fever which can be remembered. The history of this great epidemic is unfortunately very incomplete, but some interesting details can be gleaned from the reports of the different Sanitary Commissioners.

SECTION II.—

Fevers were more wide-spread and fatal than even cholera or small-pox.

69. In the report for Bengal allusion is made to severe fever epidemics which occurred at Burdwan and at Serampore, but the papers to which reference is made as containing the history of these outbreaks are not printed with the report. The measures of relief which were adopted only are described.

Fever was very prevalent at Burdwan and Serampore, in the Lower Provinces, but details are wanting.

70. In the North-Western Provinces during 1869, no less than 246,838 deaths were attributed to fevers, or nearly one-half of the total mortality of the year. The ratios for each District are not given, and it is thus impossible to compare the results in different parts of the country with any accuracy, but two facts are evident, *first*, that in nearly every District there was a marked increase of deaths from this cause as compared with the statistics of the year previous; and *secondly*, that many of them suffered from a wide-spread and fatal epidemic. The chief mortality appears to have taken place in the months which immediately succeeded the heavy rain-fall of September and the first days of October—a rain-fall which covered the country and filled every hole to overflowing. Dr. Planck is of opinion that the fever was due, in some part, to this excessive moisture, and that in the case of Saharanpore and Mozuffernugger this result was in no small degree dependent on irrigation from

The Sanitary Commissioner of North-Western Provinces is of opinion that, in those Districts which suffered most, the fever was due to over-irrigation from the canals.

the canals. The condition of these Districts was made the subject of special investigation; and, as the result of this enquiry and of his visits to the affected localities, he repeats the opinion that great part of the disastrous results of the year may be attributed to over-irrigation. The practical remedies which he recommends are contained in the following paragraph:

"344. I would, therefore, very earnestly counsel the gradual but certain establishment—

"(A.) Of such measures as may conduce to a lessened amount of canal irrigation,—

"1*st* by discouraging the cultivation of rice wherever it was not cultivated before canal irrigation was introduced, and, perhaps, the best way of doing this would he to increase the land tax of such land so long as rice is cultivated on it;

"2*nd* to introduce some method of distribution which shall require an increase to the manual labor now required to place the water so that it may spread itself over the fields;

"3*rd* to encourage a return to the ancient form of irrigation from wells in all places where the water in the wells now stands at less than 10 feet from the surface at any time of the year.

"(B.)—Of such measures as may improve the town and village sites—

"1*st* by raising them to the utmost possible extent, levelling and consolidating the surface;

"2*nd* by requiring a return to irrigation from wells of the land for a certain distance around every town and village;

"3*rd* by draining permanent water-holes to the nearest *nuddee*, the earth removed from the necessary cutting being utilized for the improvement of the town or village site;

"4*th* by planting trees between any noted source of malaria and the town or village site: by removing trees where they stand too thickly and serve no good purpose."

But Districts of the Central Provinces and Punjab, where there is no canal, suffered more.

71. The question of irrigation as a cause of malarious disease is one of great importance, not only as regards those parts of the country where canals are already in operation, but also in connection with the great works of a similar nature which have lately been projected, and some of which have been already commenced. I do not mean to throw any doubt whatever on Dr. Planck's statement that over-irrigation will make tracts of country previously healthy more subject to fever than they used to be; but such questions cannot be regarded from a merely local point of view. The prevalence of fever in 1869 was not confined to the North-Western Provinces. The Central Provinces and the Punjab, as we shall presently see, had a very heavy mortality from the same cause, and not a few of their districts where no canal runs, and which are in ordinary years remarkable for the health of the inhabitants, suffered as much as either Mozuffernugger or Saharanpore. This will appear more clear from the following comparison: The District of Goordaspore, in the Punjab, it is to be noted, has a canal running through, and it has been purposely introduced into the list so that comparison may be made between the mortality from fever in it as contrasted with the proportion of deaths from the same cause in other Districts of the Province which are not so situated.

North-Western Provinces.			Central Provinces.			Punjab.		
Districts.	Population.	Deaths from fever.	Districts.	Population.	Deaths from fever.	Districts.	Population.	Deaths from fever.
Saharanpore ...	866,483	11,189	Saugor ...	490,240	8,605	Goordaspore ...	966,126	21,824
Mozuffurnugger...	682,189	10,541	Belaspore ...	530,541	10,060	Rawul Pindee.	699,647	16,582
Banda ...	724,372	12,960	Raepore ...	586,118	9,894	Hoshyarpore...	938,890	21,344
Bareilly ...	1,464,199	17,416	Jubbulpore..	423,659	6,791	Umballa ...	1,008,952	13,875

The comparison is not altogether fair, because registration is, I believe, much less imperfect in the Central Provinces and Punjab than it is in the North-Western Provinces, and the

proportion of deaths, which are not recorded at all in the North-Western Provinces, must be much greater than it is in these other portions of the country. But, allowing for this source of error, it is evident that the violence of the fever epidemic was not confined to tracts which are traversed by canals. Hoshyarpore and Saugor suffered very much more than Saharanpore; Rawul Pindee and Belaspore very much more than Mozuffurnugger; and the comparison in other cases shows little results. The epidemic was remarkable, not only because it was so wide-spread, but also because it attacked some places with greatest violence which are usually the most healthy.

The epidemic in the Punjab is not to be accounted for by the late and heavy rains.

72. In the Punjab fever contributed 272,946 deaths, or more than half the total mortality of the year. The death-rate from this one cause alone equalled 15·64 per 1,000. The proportion in different Districts varied from a minimum of 6·17 to a maximum of 24·08. In the early part of August, in may of the Districts, the epidemic commenced, it others in appeared in September, while others again did not suffer till October or comparatively escaped. The loss of life in certain parts of the country, as in Rawul Pindee, Hoshyarpore, and Goordaspore, was terrible, and the extreme prevalence of the disease prostrated the greater number of the inhabitants. The Civil Surgeons, who were consulted on the subject, were unanimously of opinion that it was due to "the late and heavy rains," assisted in some places by the weakly condition of the people caused by the high prices of food; but in my annual report for 1869, I pointed out that such an explanation does not meet the facts, and similar opinion is, I find, expressed by Dr. DeRenzy. There can be no question that up to the month of August, when the epidemic was so severe in many places, the rain-full had actually been less than in previous years when no fever prevailed.

There is no evidence to lead to the suspicion that the disease was other than malarious.

73. But while I coincide in the conclusion that the fever is not to be accounted for by the late and heavy rain, I cannot share Dr. DeRenzy's suspicion that it was not of a purely miasmatic origin, and that it may have been of the character either of that fever which, during that last ten or twelve years, has been recognized now and again in certain Jails of the Upper Provinces and the name of relapsing fever, or jail fever, or contagious fever, or of the same character as the fever, whatever may have been its nature, and I do not offer any opinion on this point, which proved so fatal to the prisoners of the Rawul Pindee Jail in 1869. Of this there is no evidence. On the contrary, the statistics of European troops, of Native soldiers, and of prisoners within the area attacked, and the description of the disease as it came under observation in regimental and jail hospitals, show that it was of the same type as that ordinarily known as malarious fever. Dr. DeRenzy twice quotes Dr. Aitken's opinion that "agues have always been observed to be diseases of moist and marshy Districts," and argues that because Rawul Pindee, which suffered so severely stands on high ground and has excellent drainage, there is, therefore, good reason to believe that the disease was not malarious. But such an argument implies that our knowledge on the subject of malaria is already perfect, and yet any one who studies the statistics of communities occupying the same locality and living to all appearence under similar conditions from year to year, must be struck with the fact that fevers which are very rare during one season, without any accountable cause become very prevalent in another. And it must, I think, be admitted that we are still very ignorant of the conditions under which the epidemic prevalence occurs, whether they be of atmosphere or soil, or be dependent on other circumstances. The epidemic prevalence of fever is just as inexplicable as the epidemic prevalence of cholera. It is quite impossible to believe that the fever epidemic of 1869, which was so destructive over so large a portion of the North-Western Provinces, the Central Provinces, and the Punjab, and which was at its height in all of them about the same time, could have been spread by human intercourse, especially when we have the positive evidence that the cases of the disease, which came under intelligent observation, could not be distinguished from the ordinary fevers which occur every season, and are known under the common name of malarious.

The immense number of cases of fever represented by the mortality is no argument against its having been malarious fever.

74. Dr. DeRenzy argues that if the great mortality which was occasioned by fever in certain Districts of the Punjab had been due to the prevalence of the ordinary malarious disease, the number of cases must have been greater than can be readily believed. "Supposing the mortality from the disease," he says, "to be at the rate mentioned by Dr. Morehead (1·33 per cent. of attacks), it would have required upwards of 460,000 cases of fever to give the number of deaths that actually occurred in October alone in the Hoshyarpore District, the populaton being 938,890. In Rawul Pindee in would have required upwards of 330,000 cases, the population of the whole District being 909,647. Good medical treatment, no doubt, largely reduces the mortality from disease; but, on the assumption that the death-rate was even double that given by Dr. Morehead, the proportion of the population prostrated by fever must have been so large as to bring the business of the country to a stand-still." But, as a matter of fact, the business of the country was for a time seriously interrupted. The almost universal prevalence of

fever among the Native population of the Peshawur Valley was assigned as one of the chief causes which prevented the earlier removal of the European troops from the cantonment when attacked by cholera. When I visited Rawul Pindee in November 1869 I found that I could not carry out my intention of going the Murree, because the Post Office cart had ceased running for the season, and the bearers were prostrated by fever. There had been difficulty in obtaining forage for the horses cantonments, and agricultural operations, I was informed, had been seriously interfered with. It was said that at one time 80 per cent. of the whole population of the District were suffering from the epidemic. But more precise facts can be gathered from the statistics of European and Native troops at the same time. Dr. DeRenzy argues that if the deaths attributed to fever in the Hoshyarpore and Rawul Pindee Districts had been due to malarious fever, one-half of the population in round numbers must have suffered from the disease in the month of October alone. At Mean Meer, in the month of October, among the Native soldiers, as a matter of fact, there were 869 admissions into hospital from fever out of a strength of 1,386, much more than one-half. Among the European troops the admissions were 486 out of 922. At Rawul Pindee, in the same month, 700 Native soldiers gave 350 cases of fever, or just one-half. In the European corps the proportion was greater; at Peshawur, in the same month, out of 2,985 sepoys there were 1,611 admissions into hospital from fever. One of the most striking features of the epidemic was its extreme prevalence over certain areas. These figures certainly do not refer to different individuals. The same persons might be attacked with fever more than once even in one month, but it may be taken for granted that Dr. Morehead's statistics were framed on the same principle, and that his ratio of mortality was deduced from cases, not from separate persons.

The deaths in certain parts of Oudh from fever were very numerous.

75. In Oudh the deaths from fevers recorded were 87,795, or 7·8 per 1,000 of the population. From the general table in which these statistics are given, it seems that the disease was very prevalent in the Districts of Oonao and Roy Bareilly, where the mortality under this head equalled 14 per 1,000; in others, such as Pertabghur and Seetapore, the loss was only 2 or 3 per 1,000. The distribution of the deaths by months is nor given, not is there any history of the disease.

In the Central Provinces there was a great epidemic of fever.

76. The Central Provinces show a mortality of 68,999 persons from fevers, or 39 per cent. of the whole mortality of the year. In his remarks on the epidemic, Dr. Townsend refers to the large element of error which is likely to arise under this head to which I have already alluded, and doubts whether it is advisable to attempt to register the deaths from fever separately, but with all its imperfections the information is still of great value. Dr. Townsend is of opinion that the fever of the hot season may, in great measure, be due to impurity of water while the extent to which the fever of the autumn months shall prevail depends on the rain.

"If the rain-fall has been abundant, and, more especially, if it has been continued late in September and October, the development of malaria will be great, and *vice versâ*. The seasons of 1868 and 1869 afford marked evidence on this point. In 1868 the average rain-fall of the monsoon over the whole Province was 15 inches below the average, and the deficiency was greatest in the months of September and October. The morning dews that usually prevail in the autumn months were light and soon ceased, the water in the wells was very little increased, and the sub-soil water remained at a considerable depth from the surface. Under these circumstances the development of malaria was unusually slight, and had comparatively little effect on the returns of mortality from fever. On the other hand, in 1869, the rain-fall of the monsoon was abundant, and, more particularly, the fall in September and October was more than double the average, and three times what it was in 1868, and the returns of the autumn months show a marked increase in the mortality from fever over the corresponding period of the previous year. This increased mortality, however, was not altogether due to the greater prevalence of malaria, for the malaria of these Provinces is not, under ordinary circumstances, directly fatal to life; but in 1869, in many Districts, a large portion of the population had been suffering from insufficiency of food from the commencement of the year, and many who had been able to drag through the hot weather succumbed under the climatic changes produced by the monsoon, and were carried off by attacks of fever which, under better circumstances, they would have been able to withstand."

The increased rain-fall, especially in the later months of the year as we have already seen does not solve the unusual occurrence of fever in the Punjab, and without a more detailed statement it is difficult to judge how far the two were connected in the Central Provinces. A comparison of the monthly rain-fall in each District in 1869 with that of 1868 is required, as well as a statement of the monthly deaths from fever in similar detail. As Dr. Townsend observes, the conditions which favor the development of malaria form a very difficult subject of study, and the special attention which he proposes to devote to it will, I doubt not, elicit some interesting particulars.

77. In the Madras Presidency 132,346 deaths were attributed to fever, or a ratio of 5·3 per 1,000, a proportion very nearly equal to one-third of the whole mortality. The remarks of Dr. Cornish, the Sanitary Commissioner, on the epidemic are of much interest, especially in connection with the question of the influence of canal irrigation in favouring the prevalence of the disease, to which allusion has been already made.

In the Madras Presidency fever was severe, and it prevailed most in the non-irrigated Districts.

"The year 1869," he observes, "has been remarkable for a considerable increase in the fever mortality of the population of the Madras Presidency.

"Fever has been specially fatal in the Districts of Godavery, of Kurnool, Vizagapatam, Cuddapah, Gangam, Malabar, and South Canara. The small population on the Neilgherry Hills, too, has suffered unduly.

"The highest mortality of all has occurred in the Godavery District (12·0 per mile), where a large tract of country is under canal irrigation. If a similar mortality had occurred in the adjoining irrigation District (Kistna), or in the delta of the Cauvery (Trichinopoly and Tanjore), where irrigation has been practised for many years, it would have become a question whether some connection might not have been traced between the accession of fever and the influence of canal irrigation; but, as a matter of fact, fever has been more prevalent and fatal in the Districts of Bellary, Kurnool, and Cuddapah for the past four years where there are no irrigation works to speak of, than in the Godavery District for the same time; while the irrigated Districts of Kistna, Tanjore, and Trichinopoly have had a fever mortality of *fifty per cent.* below that of the dry Districts just mentioned.

"The fluctuations in fever mortality in the several Districts deserve to be carefully studied from year to year. So far as the figures of the four years enable one to come to any conclusion, the causes producing fever would appear to be operative over widely-extended tracts of country at the same time, and to be in action for long periods together. It is noticeable that a high fever rate in Ganjam and Godavery has been co-existent with a similar high fever range in Lower Bengal, in Kurnool, and South Canara, places which are very wide apart."

78. The statistics of the Bombay Presidency do not afford any information on the subject of fevers. The deaths due to this disease are not separately entered, nor are any remarks made on this cause of mortality by the Sanitary Commissioner.

No statistics are given to show the deaths from fevers in the Bombay Presidency.

79. Bowel complaints and the various kinds of injuries as causes of mortality do not require special notice; for, although they are separately entered in some of the annual statements furnished by the Sanitary Commissioners, they do not find place in all of them, and, as a rule, no comments are made with regard to them. With the general introduction of the new forms, this want of information will be supplied, and the interesting facts, which may be elicited under these several heads, will, no doubt, invite attention.

SECTION II.—D.

Bowel complaints and injuries are not generally commented on by the Sanitary Commissioners.

80. This sketch of the history of the diseases, which chiefly contributed to the mortality of the different Provinces, rapid and imperfect as it has been, has occupied so much space that I must content myself with a very brief notice of the matters which remain to be discussed. The main facts regarding the meteorology of the year have been already recorded in my annual report for 1869, but they may be very briefly recapitulated here for the purpose of ready reference in connection with the general history of disease. In the Lower Provinces, Mr. Blanford shows that—"the most striking feature of the temperature of 1869, as compared with that of 1868, is the high range in the first five months of the year" ..... "the fall of rain was less than the average in Orissa, the Gangetic Delta, and Arracan, also in Eastern Bengal except Sylhet, and *probably* Cherra Poonjee, in Lower Assam, Sikkim, and parts of Behar. It was above the average at Sooree and Berhampore and over a tract of country stretching between the Rajmehal Hills and the Bhutan Dooars, including Dinagepore, Rungpore, and probably Julpigoree and Buxa. The rain-fall in Upper Assam seems also to have been in excess of the average, and it certainly was so in Sylhet." The meteorology of the North-Western Provinces is not discussed separately, nor are any statements of temperature, rain-fall, &c., given for the Province; but allusion is made here and there to the peculiar characters of the year. "The remarkable features as regards climate were a lengthened hot season, a dry ardent season, commencing early and extending far into what is usually counted as the rainy reason,—a delayed rainy season characterized by a rain-fall of more than average quantity, and ending in quite a flood of rain as late as the first ten days of October." No separate section of the Punjab report is devoted to meteorology; but a summary of observations in the Punjab by Dr. Neil, the Meteorological Reporter of the Province, is given as an appendix. There was the same general history here as in the North-Western Provinces,—a high and protracted temperature during the first five months of the year and a heavy rain-fall distributed over a comparatively

SECTION III.

The *meteorology of the year* was remarkable.

short period. In the report for Oudh, no mention is made of meteorology; but the subject has received much attention in the Central Provinces where observations are recorded in a certain number of stations under the superintendence of the Sanitary Commissioner. The general results for 1869, as compared with those for 1868, are thus stated by Dr. Townsend:

"The mean barometric pressure was greater in January, February, April, August, and November, less in the other months.

"The mean temperature was considerably higher in the first-half of the year, *i. e.*, in the spring and hot weather, lower in the rainy season and autumn.

"The mean humidity was less in the first-half of the year, considerably in excess during and after the rains. There was less cloud in May, the hottest month of the year. In the autumn the amount of cloud was greatly in excess over the season of 1868. This is a rather important point with reference to the relative prevalence of blight in the corresponding seasons of the two years.

"The rain-fall was less in the spring and hot weather, greater during the monsoon, and this was more especially the case in the months of September and October.

"In the general direction of the wind, there was no great difference in the two years. South and South-Westerly winds were to a slight extent more prevalent in 1869 in March and in September. The velocity of the wind was much the same during the hot weather in both years, it was considerably less in the rainy season, greater in October.

"The amount of ozone, as estimated by Schonbein's test, was generally less than in the preceding year, but greater in June, October, and November."

SECTION IV.

The food supply of the people.—This important subject has been discussed in a separate section only by the Sanitary Commissioner of the Central Provinces.

81. Dr. Townsend is the only one of the Sanitary Commissioners who has devoted a special section to the consideration of the food supply of the people, and the information which it contains is not only full of interest, but has a very important bearing on the sanitary history of the year. In the other annual reports, the subject does not receive the attention which it deserves; in some it is passed by altogether, in others only incidental mention is made of it, and yet there can be very little doubt that the famine in 1869, the effects of which were felt far beyond the area in which the crops had failed, had no small influence in favouring the spread of the great sickness of the year and in determining the excessive mortality which it occasioned.

SECTION V.

The record of *personal proceedings of the Sanitary Commissioners* is generally defective.

82. On hundred and one different places in the Lower Provinces were visited by the Sanitary Commissioner during the year. Dr. Smith mentions that he travelled 2,500 miles in the course of these inspections, and was absent from the Presidency on tour for nearly nine months out of the year. Great part of Dr. Planck's report is occupied with a description of 35 towns and cities which he inspected. The Sanitary Commissioners for the Punjab and Oudh append to their reports remarks made on the sanitary condition of certain towns which they visited, but there is no general record of any inspection tour. In the Central Provinces, although the movements of the Sanitary Commissioner are not detailed, Dr. Townsend visited a large portion of the country and minutely examined the circumstances attendant on the unusual prevalence of disease.

SECTION VI.

Sanitary Progress.—This subject has not been generally discussed in the reports.

83. Excepting in the Punjab Report in which Dr. DeRenzy has devoted a special section to "the Progress of Sanitary Improvement," the important question of what sanitary measures were either suggested or effected during the year has not received from the Sanitary Commissioners generally that prominent notice which it merits. The orders of the Government directing special attention to this subject had not reached them when their reports for 1869 were prepared. In future years full details will doubtless be given.

Dr. DeRenzy's remarks on venereal disease among European troops greatly under-estimate its importance as a cause of inefficiency among them.

84. Before concluding my review, I must refer to certain remarks on the subject of venereal disease and the measures which have been undertaken with a view to its prevention which have been made by the Sanitary Commissioner of the Punjab in a letter, copy of which forms one of the appendices of his report. Referring to the opinion of the Sanitary Commission of Bengal, as expressed in their annual report for 1864, an opinion on which all the rules and regulations for the prevention of venereal disease have been based, Dr. DeRenzy states that, in his belief, the evils attributed to this cause have been greatly exaggerated; that the means adopted to check them have failed, and that all measures intended to accomplish this object will meet with a like result. The point referred to the Sanitary Commissioner by the Government of the Punjab appears to have been not the advisability of attempting to protect European soldiers from this disease, for that question has already been fully discussed, and the necessity

for such preventive measures had forced itself on the attention of the Government, but simply how the measures which had been already in operation within the cantonments could best be extended to such of the neighbouring civil population, from among whom the soldiers were believed to contract the disease; how, in fact, the Sanitary Commissioner could best discharge one of the important duties which were originally assigned to him. Dr. DeRenzy has, however, discussed the question of the advisability of attempting any such protection at all, and his statements, which very imperfectly represent the facts, have, I understand, been claimed by the opponents of the Contagious Diseases Act in England as arguments why this Act should be abolished. In their report for 1864, which has been already referred to the Sanitary Commission for Bengal quoted the opinion of Dr. Duncan Macpherson, to the effect that "fully two-thirds of those who imbibe the disease are invalided within five years, and are sent out of the service with a loathsome poison circulating in their veins which passes down to their posterity." Taking the figures from Dr. Bryden's table, Dr. DeRenzy states that in the five years, 1864—1868, there were 36,879 admissions from venereal disease, and that the total number of men invalided on account of syphilis in the same period was 509. "According to Dr. Macpherson's estimate," adds Dr. DeRenzy, "the number would have been 24,586, supposing that each admission represented a distinct individual point on which I shall remark on hereafter." But, in using this argument, Dr. DeRenzy must have been aware, and, indeed, the sequel shows that he was perfectly aware, of the fact that the admissions do not and were never intended to represent distinct individuals. The proportion of admissions into hospital from any disease among every 1,000 men is a recognized and well understood standard of health statistics. It means simply that so many cases of illness occurred, it never professed to mean separate individuals, nor could such a meaning ever be properly attached to it. In one place Dr. DeRenzy quotes these admissions as if they represented separate individuals; in another place he insists on the well-known fact that the same man may be the subject of several attacks during the year, and so swell the number of cases. So far as I know venereal disease was never pointed to as one of the great causes of mortality in the European army in India, so Dr. DeRenzy's arguments in controversion of an assertion which appears never to have been made do not require notice. It is impossible to adduce any statistics to show how much of the annual invaliding is due to venereal affections, or how far the constitution of soldiers' offspring is impaired by the syphilitic taint of the parent. No statistics could supply this information, but any one acquainted with the British soldiers knows how frequently that deterioration of health which leads to death or discharge from the service, is traceable to the syphilitic poison. There is, however, one point in regard to which we have statistics, and that is the degree of inefficiency among European troops, which is directly due to venereal disease. In my annual report for 1868 I gave a table prepared by Dr. Bryden to show the amount of inefficiency caused by the chief diseases in each month of that year, and any one who doubts the prominent place which venereal affections hold in the returns of British Military Hospitals can refer to that table and judge of the results. It is shewn there that the average number daily inefficient from this class of diseases was greater than that from any other cause whatever. The general totals for the year are as follow:

DISEASES.	Average daily number inefficient from each disease.	Average daily inefficiency per cent. of strength.
Fevers	311	·99
Dysentery and Diarrhœa	98	·31
Hepatitis	98	·28
Respiratory Diseases	92	·29
Venereal Affections	365	1·16
All other causes	635	2·01
Total ...	1,590	5·04

And this return takes no account of the many cases of illness which were due indirectly to venereal disease. In 1869, out of a total average daily sick list of 1,985 during the year, 436 of the cases were due directly to venereal. In 1870, out of a daily average total of 2,017 men in hospital, the inefficiency was due in 430 of them to venereal. I do not under-

estimate the value and importance of sanitary measures for checking cholera, fever, and other diseases, but such measures will have no effect in diminishing the prevalence of that special class of diseases to which reference is now made. There may be differences of opinion on moral grounds as to the desirability of having any measures for checking venereal disease; there may reasonably be differences of opinion as to the best measures to be adopted for its prevention; but it seems hardly credible that any one acquainted with the facts should argue that this class of diseases is comparatively of so small importance that no means need be taken for its prevention at all. The returns for 1870 are not yet complete, nor have all the reports of the Look Hospitals for that year been received. Judging from the statistics of previous years during which the regulations for the prevention of venereal disease in military cantonments have been in force, I fully admit that the results have been most unsatisfactory, and that the amount of good which has been done was by no means so great as was to be expected; but these unsatisfactory results are due not to any defects in the system, but to the very imperfect manner in which the system has been worked. Wherever the civil and military authorities have energetically combined to give it a fair trial, the results have been very different.

The work which has been already done by the Sanitary Commissioners is of the greatest value.

85. The work of the Sanitary Commissioners, as a whole, so far as it is evidenced in their reports, gives much ground for satisfaction. Their duties may be stated broadly to consist of two great divisions,—1*st*, to obtain information regarding the sanitary condition of the people, the geographical distribution of disease, the nature and history of epidemics, the circumstances favorable to their spread, and the many other matters connected with the health of the population; and 2*nd*, to point out and urge the importance of the various sanitary measures which are needed. Under the first of these heads much has been done; the history of epidemic disease throughout India in 1869, imperfect as it is, presents a striking contrast to the absence of all information which attaches to former years. The data, the collection of which has been so well begun, will gradually improve and soon form the basis for most valuable generalizations. Knowledge of disease and of the circumstances under which it breaks out in violence must form the foundation of all progress, and in this view of the case what has been effected represents progress itself. Under the second head not much has been shown, but that arises in some measure from the fact that the Sanitary Commissioners have not specially discussed the question. No great sanitary engineering works, so far as I am aware, have been inaugurated during the year; but it would be wrong to estimate progress merely by such great improvements which can be executed only at the cost of much money and by special engineering skill. It will be some time before such works can really be done on any large scale, but mean time there is ample field for sanitary improvements in the towns and villages where much that is required can be done at little expense. The first step in sanitary reform is to teach the people its value, for without their assistance it is useless to expect any satisfactory results. If the suggestions which I have lately made for placing the health department on a wider and more efficient basis be approved, I believe that an important step will be taken towards this important end.

The several recommendations which have been made in this review are here recapitulated.

86. In concluding this review, the great length of which has in great measure been due to the very unhealthy character of the year to which it refers, I shall, for the sake of convenience, briefly recapitulate the various recommendations and suggestions which have been made in the course of it; and, as these may be conveniently considered in relation to one or other of the sections which I have adopted, I shall take the opportunity of showing clearly what these sections are, in the hope that the Sanitary Commissioners will follow the same arrangement. In preparing this review I have been more than ever struck with the importance of having these reports prepared on one uniform plan, not only because it will prove a great convenience to myself, but also because it will be a great convenience to the various Sanitary Commissioners in studying each other's works and to the public generally who may be interested in sanitary matters, and who may be anxious to compare the data contained in one with those which are to be found on the same subject in the others.

Suggestions for the preparation of sanitary reports on a uniform plan are here detailed.

87. Each sanitary report should, therefore, consist of six distinct sections, and under each of them the various points now to be detailed should receive prominent notice.

I.—The vital statistics of the Province.

The annual statements should be according to the standard, from which no deviation whatever should be made. If the population to whom registration has been extended does not embrace the whole population of the Province, the fact should be mentioned in a foot-note, and any discrepancy in the numbers of the whole Province, or of any District, as compared with those of the year previous, should be explained.

The figures should be punctuated by millions and not by lakhs.

Any statistics regarding births and marriages should be shown in separate statements from the mortuary tables.

Any measures for improving the registration which have been adopted during the year should be noted, and how far any improvement has been effected.

II.—History of the chief diseases during the year—

(*a.*)—Cholera.
(*b.*)—Small-pox.
(*c.*)—Fevers.
(*d.*)—Bowel complaints.
(*e.*)—Injuries.

With regard to each of them the facts should first be recorded, and then the opinions, if any, which have been based on them.

III.—The meteorology of the year.

The main features of the year should be shortly noted, and any connection which they appear to have had with its sanitary history discussed. The monthly rain-fall and temperature in particular should be compared with the monthly statistics of disease in each District, from which such data can be procured. The daily rain-fall and daily register of other meteorological phenomena in connection with the prevalence of epidemics are of much importance.

IV.—The food-supply of the people, as effected by the outturn of the crops, the rate of wages, and the prices of grain, and such information should, as far as possible, be given for separate Districts, in relation to the comparative mortality in each.

V.—A record of personal proceedings.

This should include a note of the various places visited during the year, although the special reports on each need not always be printed. The dates of such inspections should always be given for future reference. In connection with this point, I would observe that those tracts of country should generally be selected for inspection which have suffered from any unusual sickness in the preceding season, and an attempt should be made to investigate its causes on the spot.

It may be urged that the Sanitary Commissioners are too much occupied with the supervision of registration to be able to leave their head quarters for any length of time, but they can do much more to secure efficient registration by moving about the country than by any other means. They can interest District Officers and others concerned in the work, and can satisfy themselves as to the manner in wich the registers are kept. The mere prospect of their visit will stir up the Registrars to greater attention. And with all this advantage gained they can also do much to become acquainted with the country and with the people, and to enlighten them in the benefits of sanitary reforms. The details of compilation must be done by the Office Establishment, and the results checked here and there.

Under this head also mention may be made of any special reports which have been submitted during the year.

VI.—Sanitary progress.

This should be a record of any progress that has been made in the year not only as regards the projection or execution of any great engineering works, but also, as it concerns reforms of a minor nature, any means taken to instruct the people in their value and any sign that advance has been made in this direction.

And, in offering their remarks and opinions on these different heads, and on any other matters which deserve notice, the Sanitary Commissioners should abstain from criticizing the views of other officers in the same department. The fullest and freest discussion may be carried on with regard to any theoritical opinions, and the facts of the year may be considered in the light of these opinions without imparting to the discussion anything of a controversial nature, and without endeavouring to show that the views advanced by any other Sanitary Commissioner are erroneous or calculated to do mischief.

The reports should be submitted at a much earlier date than heretofore.

Each report should be provided with a complete table of contents, and with a clear map of the Province, in which the geographical distribution of cholera and its relative fatality in different places should be distinctly shewn.

Dr. Goodeve's plan of a map for showing the distribution and prevalence of cholera requires modification.

88. I believe, however, that the idea of furnishing such a map after the manner suggested by Dr. Goodeve and ordered by the Secretary of State, must be abandoned as impracticable. The Provinces are too large to be dealt with in this way, and every map which has been attempted on this system has been more or less a failure. The main object is to show at a glance the chief facts of the epidemic, but the innumerable circles and figures which are required to illustrate the history of an epidemic among the general population would lead to the greatest confusion. It is very desirable that the same method of indicating the results should be adopted in all parts of India, and that this method should be as complete as can be desired. I propose, therefore, to consult all the Sanitary Commissioners on the subject, and then to submit an improved design of map for the consideration and orders of the Government.

GOVERNMENT OF INDIA.

PUBLIC WORKS DEPARTMENT.

IRRIGATION OPERATIONS OF LOWER BENGAL UP TO 31st OF MARCH 1871.

Circle.	Canal.	Water supplied during 1870-71.				Approximate area irrigated during 1870-71.			Total of column 8A for all previous months of current year.	Total of columns 8A. and 9.	Rain-fall.			Navigation Return.					Chief Irrigation.		Remarks.
		Full supply depth.	Estimated full discharge in cubic feet per second.	Average depth throughout the month.	Average discharge in cubic feet per second throughout the month.	District.	Area actually receiving water during the month, in acres.	Of column 8 area receiving water for the first time during current year.			Inches during month.	Inches up to date during the year 1870-71.	Average of ten previous years for the same period.	Name of Traffic.	Number of Boats.	Tonnage.	Ton-mileage.	Approximate value of goods.	Per column 8.	Per column 8A.	
1	2	3	4	5	6	7	8	8A	9	10	11	12	13	14	15	16	16A	17	18	19	20
Orissa	High Level	..	..	..	..	Cuttack ..	..	..	22,035	22,035	·38	48·92	..	.....	..	..	..	..	....	....	Canal closed for repairs.
	Kendrapara	7	1,262	5·	741·	Ditto ..	2,686	308	69,362	69,670	·38	48·92	..	Local, inclusive of 5 passengers.	*77	361	5,628	3,940	Cotton 1,905 Ploughing .. 100 Mis. 681	Cotton 304 Mis. 4	Escape 72 cubic feet per second; canal closed from 18th.
	Taldunda	8	1,300	7·25	125·	Ditto ..	..	..	22,150	22,150	·38	48·92	..	Through, inclusive of 21 passengers.	507	3,720	148,800	118,410			
														Local ..	62	872	1,860	8,880			
														Government ..	52	2,970	41,720	82,898			
														Timber ..	..	..	..	32			*On Midnapoor side, a considerable area called for water for the cultivation of tool: but Government was unable to supply them with water owing to repairs of canal going on, and so the cultivation was not attempted.
South-Western.	High Level, Midnapoor*	8	875	..	..	Midnapoor ..	..	..	29,114	29,114	6·5	56·45	..								
	Panchkoorah†	6	240	1·42	112·9	Howrah ..	..	..	878	878	5·05	..	..	Local, inclusive of 303 passengers ..	326	3,667	42,825	62,619			
	March 1870					Total ..	2,686	308	143,539	143,847				Government ..	30	448	3,760	1,020			† The cultivation of cold weather crops in 1870 proved an almost total failure on Panchkoorah side owing to salt water having entered the canal. The people were so discouraged that they did not attempt the cultivation this year.
Orissa	High Level	..	..	..	..	Cuttack ..	12	2	2,905	2,907											
	Kendrapara	..	..	..	..	Ditto ..	1,509	11	6,824	6,835											
	Taldunda	..	..	..	..	Ditto ..	..	..	..	..											
South-Western.	Midnapoor	..	..	..	..	Midnapoor ..	29	5	12,981	12,986											
	Panchkoorah	..	..	..	..	Howrah ..	..	..	1,320	1,320											
							1,541	18	24,030	24,048											Range No. 1 closed on account of repairs to Oolaharriah Lock.

The 8th June 1871.

T. M. KIRKWOOD, C. S.,
Canal Revenue Superintendent.

IRRIGATION OPERATIONS OF LOWER BENGAL UP TO 30th OF APRIL 1871.

Circle	Canal	Water supplied during 1871-72: Full supply depth.	Estimated full discharge in cubic feet per second.	Average depth throughout the month.	Average discharge in cubic feet per second throughout the month.	Approximate area irrigated during 1871-72: District.	Area actually receiving water during month, in acres.	Of column 8 area receiving water for the first time during current year.	Total of column 8A for all previous months of current year.	Total of columns 8A and 9.	Rain-fall: Inches during month.	Inches up to date during the year 1871-72.	Average of ten previous years and for the same period.	Navigation Return: Nature of Traffic.	Number of Boats.	Tonnage.	Ton mileage.	Approximate value of goods.	Chief Irrigation: Per column 8.	Per column 8A.	Remarks.
1	2	3	4	5	6	7	8	8A	9	10	11	12	13	14	15	16	16A	17	18	19	20
Orissa	High Level	..	..	..	..	Cuttack	..	..	..	..	5·77	5·77	1·64	....	..	..	..	..	..	..	Canals closed for repairs.
	Kendrapara	..	..	..	..	Ditto	..	..	..	..	5·77	5·77	1·64	....	..	..	..	..	..	..	
	Taldunda	..	..	..	..	Ditto	..	..	..	..	5·77	5·77	1·64	....	..	..	..	..	..	..	
South-Western	High Level, Midnapoor	8	875	..	..	Midnapoor	..	..	..	..	4·0	4·0	3·42								*Vide* remarks in March Statement. Canal closed for completion of earth-work.
	Panchcoora	6	240	5·65	15·28	Ditto and Howrah	..	..	..	..	5·65	5·65	Not known.	Local, inclusive of 168 passengers.	179	1,219	13,382	54,189	..	..	Ditto ditto ditto.
														Government	26	338	1,680	497	..	..	Oolooboriah range closed for repairs.
						Total	..	..	..	..											
	April 1870.																				
Orissa	High Level	..	..	..	..	Cuttack	15	15	..	15											
	Kendrapara	..	..	..	..	Ditto	931	931	..	931											
	Taldunda	..	..	..	..	Ditto	..	..	..	..											
South-Western	Midnapoor	..	..	..	..	Midnapoor	35	35	..	35											
	Panchcoora	..	..	..	..	Howrah	..	..	..	..											
						Total	981	981	..	981											

T. M. KIRKWOOD, C. S.,
Canal Revenue Supdt., Bengal.

The 8th June 1871.

Progress made in the construction of the Rohilkhund lines of the Oudh and Rohilkhund Railway, during the first quarter of 1871.

From CAPTAIN R. DEBOURBEL, R. E., Joint Secretary to the Chief Commissioner of Oudh, Public Works Department, Railway Branch, to the Secretary to the Government of India, Public Works Department, —No. 1034R., dated Lucknow, the 27th May 1871.

I AM directed to transmit the accompanying progress report for the quarter ending 31st March 1871 of the Rohilkhund Railways.

* * * * * *

3. The Consulting Engineer inspected these sections with the Deputy Chief Engineer in February and March 1871, and reports steady progress, on the whole, in well-sinking, brick-making, and bridge-building. The earthwork is approaching completion, the collection of ballast is proceeding slowly, and plate-laying has commenced from the Allyghur end, the rails being linked in as far as Rajghât, but no sand-ballast having yet been laid.

4. Upwards of 500 wells from 8 to 16 feet diameter are in process of sinking, the greater portion with the ordinary Native jham, the more modern appliances are used at the large bridges only. In some instances the supply has been very deficient through the non-receipt of the plant indented for from England. Large local purchases have had to be made in consequence at high prices, and after serious delay. One item, diving-dresses and air-pumps, must come out from England; and, from every large bridge, there was the same complaint that work in some wells was stopped for want of diving dresses. The matter has been repeatedly pressed upon the Company, but without much effect. The result is, that the Engineers, finding great difficulties in sinking the wells down a sufficient depth into clay, kunkur beds, &c., are anxious to stop short upon the latter, which is a dangerous thing to do, as a loose sandy bed is almost sure to be in motion, or to be affected by the scour down to any hard stratum beneath.

5. This question of the depth of bridge foundations is engaging much attention on the part of all concerned. Speaking generally, the depth proposed is sufficient; but in the low valleys of the Ramgunga and Ganges, where the sub-soil is all sand, the depth proposed by the Deputy Chief Engineer of 30 feet below low water for the well foundations of the Undparee, Huringphundee, Pereia, and other similar flood-channels, is considered insufficient by the Consulting Engineer, who has directed them to be sunk 40 feet below water, if in sand, throughout for abutments and piers alike. He maintains that in these bridges the single well foundations must be founded to a greater depth than the cluster of wells in an ordinary bridge.

6. The expenditure is as yet well within the sanctioned estimates, the rates of cost are moderate, in some instances remarkably so, and generally a good spirit of economy prevails.

OUDH AND ROHILKHUND RAILWAY—ROHILKHUND LINE, AND ALLYGURH BRANCH.

Deputy Chief Engineer's Quarterly Progress Report,—No. 19, dated Bareilly, the 31st March 1871.

ALLYGURH BRANCH—60·6 MILES.

MY inspection of this section, comprising works from Allygurh junction with the East Indian Railway to Chundowsie was made during the month.

The time it has now been under construction is for—

			Total.	Rains.	Full work.
Earth-work	...	... months	18	5	13
Brick-work	...	... „	12	4	8

On Division 4A—B, which extended to the Ganges the question of crossings of Futtehgurh Branch of the Ganges Canal remains still undecided, keeping 4½ miles of line work more or less in abeyance.

Earth-work is completed, with the exception of that to meet canal requirements above referred to.

Special Bridges.—Sinking has made slow progress, mainly due to the character of soil passed through; the Wells in South pier have at last reached their full depth; those in North pier have five feet further to be sunk, girders should be fixed by the end of July.

Ganges Canal.
2 No. 60 feet skew with.
2 „ 30 „ side openings.

Satisfactory progress was making at this bridge in well-sinking. Brick-making and all other arrangements were good, showing a marked improvement; and the girders should be in place by the end of September.

Kallee Nuddee.
5 No. 56 feet skew openings.

On wells, all of which are in position and sinking, fair progress making, and this should be completed by the 15th of October.

Choyea Nuddee.
4 No. 30 feet.

Work at this cannot be commenced, its position not having yet been decided: pure sand is met with a few feet below surface of ground, and the foundations will have to be on wells.

Futtehgurh Branch of Ganges Canal.

Small Bridges and Culverts, but few remain to be completed; all should be so by the end of season.

Plate-laying.—Twenty-five miles of permanent way are laid and linked in on formation level, leaving five miles to complete to the Ganges River, with short breaks at the Ganges Canal, Kallee and Choyea Nuddees.

Sand-ballast will have to be led by engine and ballast-train, and this is daily expected from Calcutta.

Telegraph has been completed through this Division.

Ganges Bridge.—Rajghát.—Number 33, 80 feet openings.

This work is making satisfactory progress. The bed of clay and kunkur met with in North abutment at a depth of 28 feet below low water, is also struck in every well yet sunk at the same level, extending completely across and forming this river's bed, it has been sunk into 10 feet, and for that depth is similar in character, although working through it is slow and expesive; it is favourable and advatageous in many other respects.

The completion of bridge is dependent upon progress made with sinking: this may be finished by June 1872; but it is doubtful if the piers could be built up to girder level by that date, and therefore the completion of this structure cannot safely be calculated upon earlier than January 1873.

Sanction for commencement of well-sinking was received in December 1869, and would thus be allowing three years under construction: the length of bridge is 3,052' 6".

On the section of this branch, which extends 30 miles beyond the Ganges to Chundowsie, and comprises our heaviest works, crossing the Ganges Valley with its flood inundations.

Earthwork.—Banks and cuttings completed, with the exception of backing-up to bridges in progress.

Small Bridges and Culverts.—Completed ready for girders.

Special Bridges.—The pier wells are all sunk 30 feet below low water, and are in clay, through which progress is slow. The abutment blocks are also to this depth and into clay, all wing blocks down 20 feet.

Burdmav.
3 No. 56 feet with.
2 „ 30 „ side openings.

The whole of the pier wells are sunk an average of 38 feet below low water. The North and South abutment wells to 30 feet below low water. All the South defence wells 12 feet, the North 20 feet.

Mahawa.
8 No. 56 feet openings.

Pier wells sunk to 37 feet below low water. North and South abutment wells also to 37 feet. The defence wells being down 12 feet.

Flood Chanels Jheel No. 1.
4 No. 56 feet openings.

The South abutment wells sunk 37 feet below low water. At the North sinking commenced, the defence wells being down 8 feet. The particular attention of the Engineer has been called to these abutments, works and orders given to arrange to press on with them day and night, the pier wells cut off to 2 feet above low water being secure.

Jheel No. 2.
5 No. 56 feet openings.

Cherere Jheel.
3 No. 30 feet openings.

Pier blocks sunk 15 feet, abutment blocks 25 feet, wing blocks 5 feet.

Chooea Nuddee.
4 No. 56 feet openings.

Pier wells sunk 35 feet, abutment wells 35 feet, the defence wall is to be on open foundations and will be built as soon as abutment well sinking is complete.

Sote Nuddee.
8 No. 56 feet.

Pier wells sunk to their full depth 45 feet, and concreting South abutment main well concreted, North abutment sunk 35 feet, wing well sunk 15 feet.

The abutments at all special bridges will, on the statements lately received from the Engineers in charge, be completed to above highest flood level on or before the 30th June.

Ballast.—The greater portion of the kunkur has been delivered, sand will be led by ballast-engine.

Plate-laying.—The permanent way between Ganges and Chundowsie will not be led up until after the rains, that is, the end of October, by that time it can be carried from Allygurh to Ganges by material-train.

With the exception of the Ganges bridge the rails should be laid and ballast-train working into Chundowsie by March 1872, thus giving 30 months under construction, of which 8 during rains and floods work is to a great extent suspended.

SHAHJEHANPORE TO MORADABAD—116 MILES.

This section was inspected towards the latter end of February.

Earthwork is, with the exception of backing to bridges, now completed.

Small bridges and culverts.—The greater number of these are ready for girders, and all will be finished before the rains.

Special bridges.—Very satisfactory progress has been made; the length of these girders was altered from 66' to 72' 6" in January of the present year, the curbs placed for the former had to be removed and some brickwork pulled down, 16 piers of the total number 17 have been sunk to an average of 18 feet below low water, and the sinking will be continued and all cut off before floods to low water level.

Gurra River.
18 No. 60 feet openings.
72' 6" girders.

Orders have been given to press on the East abutment to check any tendency of the river cutting into that bank.

All piers are closely approaching the final depth to which they are to be sunk, and progress is therefore slow. One has been completed and concreted, the abutment blocks are down to 35 feet below low water.

Byghool.
6 No. 56 feet with 2-30 sides openings.

Kilpea Nullah.
3 No. 30 feet openings.

Well-sinking in piers and abutments completed, well and piers, abutments and wings built up to 4 feet.

Nukkutea.
4 No. 60 feet skew.

Founded on blocks, all sunk to their full depth and in process of concreting.

Dejoura.
3 No. 56 feet openings.

Simple abutment, all wells sunk 33 feet below low water.

Underhea.
3 No. 30 feet.

On well sunk 27 feet, depth proposed 30 feet with drop walls.

Hurrumphanda.
4 No. 30 feet.

On wells sunk to 27 feet, depth proposed 30 feet with drop walls.

Kaliassie.
6 No. 30 feet.

On wells sinking commenced.

Uril River (1st).
6 No. 30 feet openings.

Progress slow, partly due to short supply of bricks, all wells down 26 feet below low water.

Nawab Nullah.
8 No. 30 feet.

Pier wells sunk 28 feet below low water, abutment block in progress.

Uril River (2nd).
3 No. 56 feet openings.

Block abutment on wells, pier sunk 30 feet below low water, block abutment wells wing walls commenced.

Gunghun River.
10 No. 56 feet openings.

On wells all sunk to 30 feet below low water, wing wells commenced.

Ballast.—The greater portion of kunkur has been collected, sand has to be led by ballast-engine.

Plate-laying.—The cost of carting permanent way by road being a serious item of expenditure; this work is in abeyance pending delivery by rail. To expedite this it is intended

to construct a temporary bridge at low water level and lay down rails across the Ganges Rivet at Rajghât, and at other special bridges which may not have been completed, and this work will be taken in hand early in November.

Brick-making has, on the whole section, made satisfactory progress, the exception being between Ramgunga River and Aounlah, where the supply has not equalled the demand, owing partly to the large increase of water-way on this section.

With the exception of the Ramgunga Bridge, the rails should be laid over this section by December 1872.

Ramgunga Bridge.
No. 36, 56 feet openings.

Work makes good progress, better would have been attained with steam hoist for lifting the large sand pump; none have been delivered to date. The Resident Engineer speaks very highly of Mr. Bull's hand-dredger as a valuable and useful implement for well-sinking through sand.

On the estimate forwarded by the Resident Engineer, this should be finished by February 1872, and there is every reason to hope this will be the case, if so the piers should be ready for girders by June 1872; these being available, the work should be completed by December 1872.

Sanction for well-sinking was received on 6th April 1870, the first well commenced on the 22nd, the time under construction has therefore been twelve months, during four of which work was suspended by rain and floods.

The portion of protection pitching East bank injured by last floods is being re-placed, and arrangement will be made to divert or ease the main current of river from this wall during next flood.

A project for the construction of a bund on West bank similar to that already constructed on East side, is in preparation and will be shortly submitted.

A survey of a river extending some distance above and below bridge site has been completed for record.

LUCKNOW TO SHAHJEHANPOOR,—101 MILES.

This section was inspected during the month of February.

Work on banks and cuttings, minor bridges and culverts with preparation of material, was sanctioned on 17th March 1870, but Engineers were not available for 3rd and 4th Sub-Divisions until May. A portion only of the first working season may be considered as past.

Sanction for special bridges was received on the 1st February of the present year, one month from date of this report.

Earthwork.—Banks and cuttings finished. Some consideruble portion has not as yet had a season's rain since completion.

Brick-making has been carried out by the Company's Engineers, and with good results both in quality and quantity.

Small bridges and culverts.—For the first 30 miles out of Lucknow, the greater portion of these are either completed or in progress; from that point in to Shahjehanpoor, work is not so well advanced, but good progress may be calculated on before the commencement of the rains.

Canal Bridge.
1 No. 60 feet skew.

Special bridges.—Open foundation, built to 10 feet under formation.

Bettah River.
4 No 56 feet openings.

(1.) Well foundations 30 per cent. of sinking executed, and the work is estimated to be completed to flood level by the end of June.

(2.) Open foundations concreted and brick-work in piers, abutments and wing walls built 8 feet above that level, with every prospect of completion to formation level before the rains.

Bettah River.
3 No. 30 feet openings.

Saie River.
3 No. 56 feet openings.

Well foundations, work commencing.

Sookheeta River.
4 No. 30 feet openings.

Well foundations, curbs placed, bricks and other material on ground.

Kuhnout River.
10 No. 56 feet openings.

All pier wells started and sinking, a good stock of material on ground.

Ballast.—A considerable percentage of kunkur and broken bricks has been collected and stacked. Sand will have to be led by engine and wagons from pits.

Plate-laying.—A commencement and junction into the Lucknow and Cawnpoor Line has been made: work will be carried on telescopically from that point.

This section of line should be completed to the Kuhnout Bridge, near Shahjehanpoor, by June 1872.

Ramnuggur Branch.—Plans and estimates are before Government.

General.—My inspection tour extended from latter part of January to the end of March, the whole of the line and every bridge and culvert under construction visited. Close attention has been given to the quality of the mortar, samples of which are taken weekly from that in use on each sub-divisional section and preserved as official records at each Engineer's Office.

The general health of the staff has been good, and no changes made during the month.

Returns shewing details and percentage of work executed are forwarded herewith.

From the Government of India, Public Works Department, to the Chief Commissioner of Oudh,—No. 1179R, dated Simla, the 7th July 1871.

I AM directed to acknowledge the receipt of your Joint Secretary's letter No. 1034R of the 27th May last, submitting the progress report of the Rohilkhund Railways for the first quarter of 1871.

2. The information furnished by the Deputy Chief Engineer is very complete and of great interest, and I am directed to express the satisfaction of the Governor General in Council at the vigorous manner in which the works have been prosecuted by Mr. Lovell and his staff.

GOVERNMENT OF INDIA.

LEGISLATIVE DEPARTMENT.

Abstract of the Proceedings of the Council of the Governor General of India, assembled for the purpose of making Laws and Regulations under the provisions of the Act of Parliament 24 & 25 Vic., Cap. 67.

The Council met at Simla on Tuesday, the 11th July 1871.

PRESENT:

His Excellency the Viceroy and Governor General of India, K. P., G. M. S. I., *presiding.*

His Honour the Lieutenant-Governor of the Panjáb.

His Excellency the Commander-in-Chief, G. C. B., G. C. S. I.

The Hon'ble John Strachey.

The Hon'ble Sir Richard Temple, K. C. S. I.

The Hon'ble J. Fitzjames Stephen, Q. C.

The Hon'ble B. H. Ellis.

Major-General the Hon'ble H. W. Norman, C. B.

The Hon'ble F. R. Cockerell.

The Hon'ble R. E. Egerton.

The Hon'ble MR. EGERTON took the oath of allegiance, and the oath that he would faithfully discharge the duties of his office.

OATHS AND DECLARATIONS AMENDMENT BILL.

The Hon'ble MR. STEPHEN, in moving for leave to introduce a Bill to amend Act No. V of 1840 (concerning the oaths and declarations of Hindoos and Mahometans), said that the measure had been necessitated by the discovery of

one of those small inaccuracies which it was so difficult to escape in legislation, but which were calculated to produce inconvenience. Act V of 1840, by which at present the subject was regulated, was so worded as to be applicable only to the case of witnesses in Court. It was desirable, however, that the substitution of a solemn affirmation for an oath should be lawful in other cases, besides that of witnesses, as, for example, jurors in criminal cases tried by juries, and under the Coroners' Act, 1871. The object of the proposed measure was to extend Act V of 1840 so as to embrace such cases.

The Motion was put and agreed to.

BRÁHMA MARRIAGE BILL.

The Hon'ble MR. STEPHEN, in moving to add the Hon'ble Mr. Strachey to the Select Committee on the Bill to legalize marriages between members of the Bráhma Samája, wished to take the opportunity of making a few observations as to the present position of the Bill. The matter was one of great delicacy and importance, and some explanation appeared desirable as to the course which had been pursued with respect to it. The Bill, which was originally brought forward by his predecessor (Mr. Maine), would have had the effect of establishing a system of civil marriage for all classes in India. This step was justly considered one of extreme importance, and the opinions of all the Local Governments were requested with reference to it. Their opinions were, in many instances, unfavourable to the proposed measure; but it appeared to be generally thought that there would be no objection to a measure which would meet the wants of any individual sect, such as the Bráhma Samáj. A Bill, thus restricted in its scope, was framed accordingly, and published in the Gazette. Thereupon, a deputation had represented that there were great objections to it on the part of many members of the sect. This was entirely new to him (MR. STEPHEN), as he had supposed that the whole of the Bráhma body wished for a Bráhma Bill, if the general Bill could not be had. He had accordingly promised to wait for three months before proceeding with the Bill. Just before the end of the three months there had come another deputation with memorials, the signatures to which were alleged to amount to 2,000, objecting strongly, for reasons set forth in their petition, to the passing of any Bill at all on the subject. Under these circumstances, there seemed but one course open to him, namely, to promise to postpone any further dealings with the Bill till the Government returned to Calcutta, when the representatives of the two opposite factions of the Bráhma sect might be confronted, and the real wishes and objects of each be ascertained. There had been warm discussion in the papers, and the advocates of the measure—progressive Bráhmas as they were called—had complained vehemently at the delay of three years which had occurred in dealing with the measure; their complaints were certainly not altogether unnatural. Many personal imputations had been made, which MR. STEPHEN had been sorry to see, but of the justice of which he individually knew nothing. MR. STEPHEN himself had been blamed for delaying to pass the Bill now in deference to objections which the Committee was supposed to have considered before it submitted its report, which objections were contained in a memorial submitted to them in 1868 by the Adi Bráhma Samáj. The fact was, that the memorial in which those grounds were urged, though mentioned in the list of papers referred to in the margin of the report, had never come before him, though it had apparently been considered by the Committee as originally constituted and probably formed one at least of the reasons why the Bill had been thrown originally into a general form. The Bill, as brought to his notice, was a general Civil Marriage Bill, and all the papers before him discussed the propriety of a measure of that nature. There was nothing in any of them to show the existence of any difference of opinion between different sections of the Bráhmas as to a Bráhma Marriage Bill. It was quite true that he had signed the report which stated that the Committee had examined a

number of papers mentioned in the margin, of which the memorial of the Adi Bráhma Samáj was one; but he individually had never seen that paper. The papers which he did see referred to the general measure exclusively. The difficulty was really a very considerable one, owing to the divided condition of the sect, and their opposed wishes on the matter. Any class of persons practically debarred from marriage by their religious belief, certainly seemed to be entitled to legislative relief; but it was one thing to meet the wishes of a small body of persons, and another to make a change which might be regarded in the light of a direct attack on the institutions of the country. When the wishes of the two contending parties among the Bráhmas had been ascertained, an opportunity would be taken of announcing the course which Government intended to pursue with reference to the subject, and of stating the form in which whatever relief it might be considered necessary to give, would be given. Apart, however, from this, the character of the new memorials submitted to him was such that he considered himself bound to get, if possible, to the bottom of the matter, even at the expense of a delay which he regretted, and the case was emphatically one in which it was a less evil to go too slow than to go too fast.

The Motion was put and agreed to.

GENERAL REGULATIONS AND ACTS (DEHRÁ DÚN) BILL.

The Hon'ble MR. COCKERELL moved that the Report of the Select Committee on the Bill to bring the Dehrá Dún within the operation of the General Regulations and Acts be taken into consideration. He said that the Bill, as introduced, was framed on the assumption that, although the result of previous legislation in regard to the Dehrá Dún had been to leave it not subject to the General Regulations and Acts, the District had, in fact, since the passing of Regulation V of 1829, been administered as though such enactments were legally in force there. It had since been ascertained that, even if such was the case as regards a large majority of the enactments in force in the Regulation Districts, it was not so in regard to all.

For example, up to the occurrence of the case of Dick *v.* Heseltine, during the year 1868, it would appear that Act X of 1859 was held not to be in force in the Dún, and that it was the practice in all matters relating to rent to follow the old 'Summary Suit' Regulations, as they were called, which were superseded, and, in fact, expressly repealed by the said Act.

Why that Act, which was obviously designed to take the place of the 'Summary Suit' Regulations and to be the rent law wherever the latter were in force at the time of its enactment—for it contained no other indication of its intended local extent—was supposed not to be applicable to the Dún, previously to the occurrence of the case to which he had referred; and why it was then suddenly treated as though it were in operation in that tract, he was unable to discover.

In this curiously confused state of things provision had to be made for curing the possible invalidity of two classes of past proceedings on the part of the Courts heretofore exercising jurisdiction in the Dehrá Dún District,—(*1st*), decisions and orders passed on the supposition that the General Regulations and Acts constituted the law of the Dún, and, (*2nd*), decisions and orders governed by the 'Summary Suit' laws which were repealed by Act X of 1859.

We had at the same time to maintain the legality of proceedings which might have been held on the authority of the High Court's ruling in the case of Dick *v.* Heseltine, to the effect that the General Regulations and Acts were not legally in force in the Dehrá Dún.

The first section of the Bill had been re-cast so as to secure those objects. It purported to set up whatever had been done in accordance with any Regula-

tion or Act, repealed or unrepealed, without, at the same time, invalidating what had been done at any time not in conformity to any such enactment.

The only other alterations contained in the amended Bill related to the jurisdiction of the Courts and Chief Revenue Authorities. It had been found necessary to confer jurisdiction within the Dún upon the High Court and Board of Revenue in express terms. The mere extension of the Regulations and Acts would have been insufficient to give that jurisdiction.

The local limits of the High Court's ordinary jurisdiction were identical with those of the former Sadr Adálat. The local jurisdiction of the latter was derived from Regulation VI of 1831; that of the Board of Revenue from Regulation X of 1831. In both those Regulations the local jurisdiction was defined by reference to another Regulation (I of 1829), and the latter contained no mention of the Dehrá Dún District.

So also as regards the District Court of Saharunpúr. That Court had for many years past exercised, and still continued to exercise, jurisdiction within the Dún without any legal authority. The third section had been added to give retrospective validity to its proceedings, and to reserve a right of appeal within the period allowed by the law of limitation in cases in which the decision or order of the Court of first instance might have been passed before this Act came into operation.

In the settlement of these details, the Select Committee had had the advantage of personal consultation with Mr. Jardine, the Government Advocate of the North-Western Provinces, who, having been professionally engaged in the case out of which this legislation had arisen, was thoroughly conversant with the several points of difficulty presented by the High Court's judgment in that case; and he (MR. COCKERELL) might say that Mr. Jardine fully concurred in the opinion of the Committee that the amended Bill effectually provided for the rectification of all past irregularities.

The Motion was put and agreed to.

The Hon'ble MR. COCKERELL also moved that the words "in the said district" be inserted after the words "proceeding had" in the sixth line of section one.

The Motion was put and agreed to.

The Hon'ble MR. COCKERELL then moved that the Bill as amended be passed.

The Motion was put and agreed to.

The Council adjourned to Tuesday, the 18th July 1871.

H. S. CUNNINGHAM,

Offg. Secy. to the Council of the Governor General for making Laws and Regulations.

SIMLA;
The 11th July 1871.

No. 27 of 1871.

SUPPLEMENT TO

The Gazette of India.

SIMLA, SATURDAY, JULY 22, 1871.

OFFICIAL PAPERS.

A SUPPLEMENT *to the* GAZETTE OF INDIA *will be published from time to time containing such Official Papers and information as the Government of India may deem to be of interest to the Public, and such as may usefully be made known.*

Non-Subscribers to the GAZETTE *may receive the* SUPPLEMENT *separately on a payment of six Rupees per annum if delivered in Calcutta, or ten Rupees eight annas if sent by Post.*

No Official Orders or Notifications, the publication of which in the GAZETTE OF INDIA *is required by Law, of which it has been customary to publish in the* CALCUTTA GAZETTE, *will be included in the* SUPPLEMENT. *For such Orders and Notifications the body of the* GAZETTE *must be looked to.*

GOVERNMENT OF INDIA.

LEGISLATIVE DEPARTMENT.

Abstract of the Proceedings of the Council of the Governor General of India, assembled for the purpose of making Laws and Regulations under the provisions of the Act of Parliament 24 & 25 Vic., Cap. 67.

The Council met at Simla on Tuesday, the 18th July 1871.

PRESENT:

His Excellency the Viceroy and Governor General of India, K. P., G. M. S. I., *presiding.*

His Excellency the Commander-in-Chief, G. C. B., G. C. S. I.

The Hon'ble John Strachey.

The Hon'ble Sir Richard Temple, K. C. S. I.

The Hon'ble J. Fitzjames Stephen, Q. C.

The Hon'ble B. H. Ellis.

Major-General the Hon'ble H. W. Norman, C. B.

The Hon'ble F. R. Cockerell.

The Hon'ble R. E. Egerton.

EUROPEAN VAGRANCY ACT AMENDMENT BILL.

The Hon'ble MR. STEPHEN introduced the Bill to amend the European Vagrancy Act, 1869, and moved that it be referred to a Select Committee with instructions to report in three weeks. He said that he had, on moving

for leave to introduce the Bill, explained the causes which necessitated the changes now proposed. It was unnecessary for him, on the present occasion, to trouble the Council with any further remarks.

The Hon'ble MR. ELLIS said that the records of some recent proceedings of the Madras Government confirmed the view that some such measure as the one now introduced was urgently wanted. It appeared from those proceedings that the Madras Government had had to deal with some twenty loafers, the majority of whom were of the very class in question, and the Government had been obliged to pay for the carriage of those men back to Australia. The fact that the Bill was as much needed in Madras as at Calcutta might, he thought, be new to the Council.

The Hon'ble MR. COCKERELL said that he trusted that it was not intended that the proposed amendments of the law relating to European vagrancy should come into operation until a sufficient period had elapsed to admit of the consignors of horses, in charge of which the persons to whom this Vagrancy Bill related were sent to Indian ports, becoming aware of the responsibility which they, through their agents or consignees, would thenceforth incur in sending such persons to India, and regulating their conduct in this matter accordingly.

It might be that his hon'ble and learned friend in charge of the Bill contemplated some provision to that effect; but, as he had not announced it, he (MR. COCKERELL) thought it necessary to draw attention to the point, as any doubt as to the intention of the framer of the Bill in that matter might subject the measure to the imputation of undue harshness.

MR. COCKERELL also wished to enquire whether the Government was in possession of any information as to the antecedents of the persons whose vagrancy had suggested the need for the present Bill. It would be remembered that, by the twenty-fifth section of the Vagrancy Act, provision was made for the imposition on the Master or Captain of any vessel conveying a discharged convict to India, of a sufficiently heavy fine to cover the cost of such person's deportation in the event of his becoming a vagrant.

He believed, he might say, that that provision was introduced into the Act in special reference to the class of persons sent from the Colonies to India in charge of horses. The majority of that class notoriously represented the refuse of the colonial population, men who would not come to India, where there was little or no prospect of their obtaining permanent employment, without any provision for their return journey, if they could obtain an honest livelihood at the Colonies.

It was with the well-ascertained fact before the Council that that class had largely supplied the ranks of vagrancy for which they were legislating, that that provision had been enacted; and what he now desired to learn was whether due care had been taken to give effect to its object, for it seemed to him that, if this Bill was to be passed without further enquiry and another means thereby secured of meeting the difficulty which that provision was chiefly designed to obviate, there was great risk of the penal enactment being wholly overlooked and becoming a dead letter.

The Hon'ble MR. STEPHEN said, in reference to the remarks of his hon'ble friend (Mr. Cockerell), that the Bill had been brought forward at the earnest recommendation of the Bengal Government, with a view to checking the arrangements by which the Australian exporters and the firms employed by them as agents for the sale of their horses, at present contrived to evade the law. Those persons knew perfectly well what they were about, and there was no particular reason for showing them much indulgence. They had shown some ingenuity in rendering the law inoperative, and the object in view now was to provide that the intention of the Legislature should be carried out. There could

be no doubt, that when horses were imported into this country in charge of grooms, and those grooms immediately became vagrants and were thrown on the public for support, the importer of the horse was the proper person to pay. The only way to get at the importer was to make the various persons, whom the owner employed in this country in connection with the sale of the horses, responsible.

With regard to the second point referred to by his hon'ble friend, MR. STEPHEN said that the Bengal Government were fully alive to the evils entailed by the present system, and would be very unlikely not to put section twenty-five of the Act into force whenever opportunity afforded. It might often, however, happen that cases might require to be dealt with, to which the provisions of that section would not apply, and the present Bill was intended to meet those cases.

His Excellency THE PRESIDENT suggested that the Committee should have instructions to report in four weeks.

The Motion was put and agreed to.

CRIMINAL TRIBES BILL.

The Hon'ble MR. STEPHEN also moved that the Hon'ble Mr. Egerton be added to the Select Committee on the Bill for the registration of Criminal Tribes and Eunuchs.

The Motion was put and agreed to.

LOCAL EXTENT ACTS BILL.

The Hon'ble MR. COCKERELL asked leave to postpone his Motion for leave to introduce a Bill for declaring the local extent of the Acts of the Legislative Council of the Governor General.

Leave was granted.

PENSIONS' BILL.

The Hon'ble MR. COCKERELL then moved that the Hon'ble Mr. Egerton be added to the Select Committee on the Bill to consolidate and amend the law relating to Pensions.

The Motion was put and agreed to.

NORTHERN INDIA CANAL AND DRAINAGE BILL.

The Hon'ble MR. STRACHEY moved that His Honour the Lieutenant-Governor of the Panjáb be added to the Select Committee on the Bill to regulate the construction and maintenance of public works for Irrigation, Navigation and Drainage. He said that he was anxious, with His Excellency's permission, to say a few words in explanation of the course which had been pursued with reference to the Bill. Considerable progress had been made by the Select Committee in the consideration of various details of the Bill before the Government left Calcutta. Much, however, still remained for disposal, and it appeared that there were such serious differences of opinion in the Committee as to several points, that Colonel Strachey, who had charge of the Bill, recorded his opinion in a paper which was before the Council, that, so far as the North-Western Provinces were concerned, it was expedient to abandon the proposed legislation altogether and to confine the operation of the present Bill to the Panjáb, where the Irrigation Department was anxiously asking for the measure, and where the Lieutenant-Governor was understood to approve of it and to consider its immediate introduction a matter of importance. It was thought, too, that, if the Bill was restricted to the Panjáb, there would be